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Rare Plants of New York State

LBB 94-1
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**Richard S. Mitchell
Charles J. Sheviak**

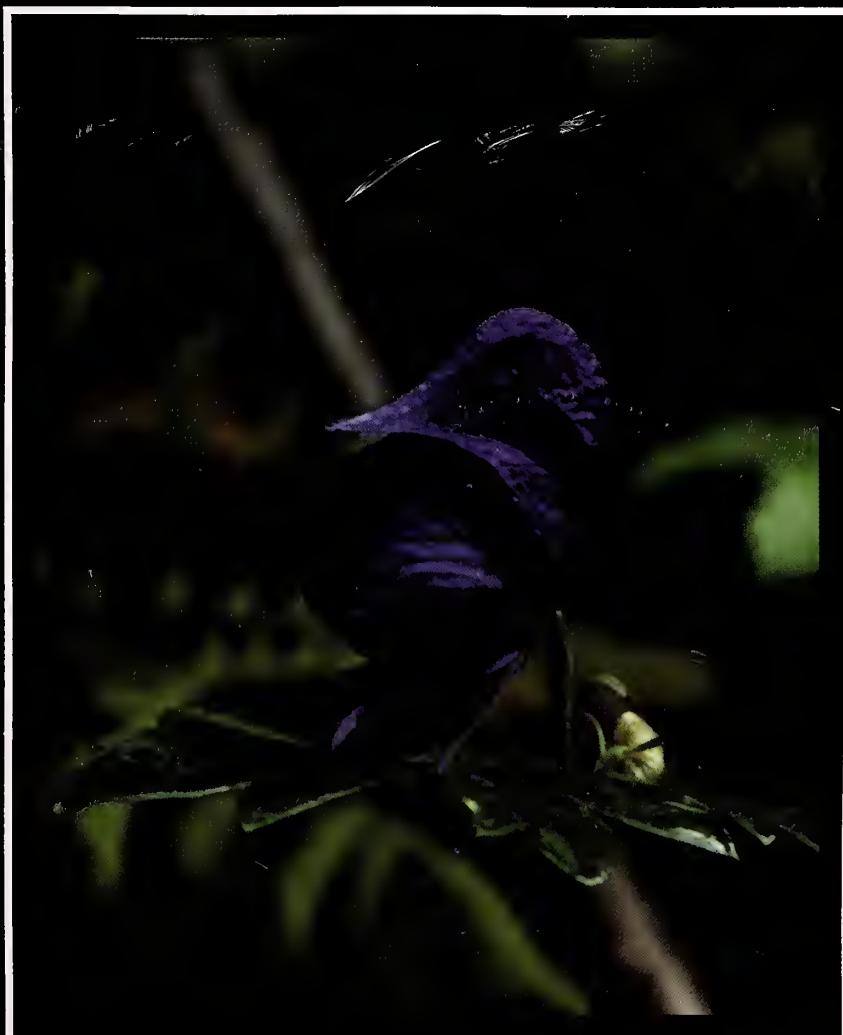


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RARE PLANTS OF NEW YORK STATE

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1981

**Bulletin No. 445
New York State Museum**

**The University of the State of New York
The State Education Department
Albany, New York 12230**

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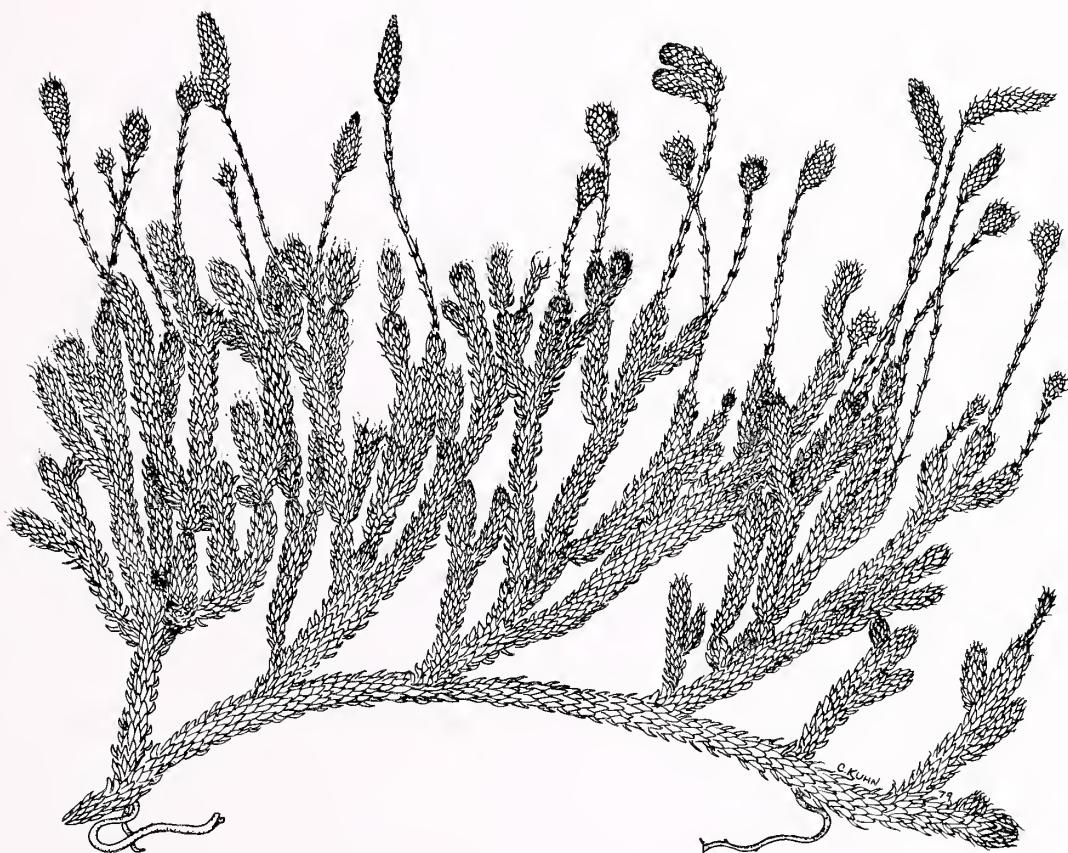
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“MANY THAT LIVE DESERVE DEATH.
AND SOME THAT DIE DESERVE LIFE.
CAN YOU GIVE IT TO THEM?
THEN BE NOT TOO EAGER
TO DEAL OUT DEATH . . .
EVEN THE WISE CAN NOT SEE
ALL ENDS.”

J.R.R. Tolkien



CONTENTS

Foreword	vi
Preface	vii
Acknowledgements	vii
Introduction	1
Extinction	1
Extirpation	1
Rarity	1
Causes of Rarity.....	2
Dispersal	2
Establishment and Seedling Success	2
Competition	2
Adaptation	2
Reproduction.....	4
Substrate	4
Climate and Microclimate	4
Newly Evolved Rarities	5
Chance.....	5
Man's Intervention	6
Rarity and the Law	7
Federal Protection of New York State Rarities	7
Table 1. Federal Status of New York State Plant Rarities (1981).....	9
Concentrations of Rare Plant Species	11
Areas of High Extirpation	11
Areas of Uncertain Future.....	12
Areas Afforded Some Protection.....	12
Status Code for New York State Rarities	13
Rare Ferns of New York State	14
Rare Orchids of New York State	31
An Assemblage of Significant New York State Rarities	41
Widespread Plants Threatened by Commercial Demand	67
Rare Plant Species Recommended for Protection in New York State	70
Species Formerly Known from the State	72
Appendix I. Species Probably Extirpated from New York State	72
Significance Symbols used in Appendix II	74
Appendix II. Plant Rarities of New York State	74
Appendix III. The New York State Protected Native Plants List	94
Glossary	95
Index to Species	96

FOREWORD

THROUGH THIS PUBLICATION we seek to reach the interested public as well as professionals in conservation and biology. The book is not intended to be a purely technical botanical document, but a practical guide and introduction to the subject of rare plants in the State. We have chosen to exclude literature citations and other materials which make reading difficult. The glossary will hopefully serve to clear up meanings of botanical terms and technical uses of common words.

IF YOU FIND A RARE PLANT . . .

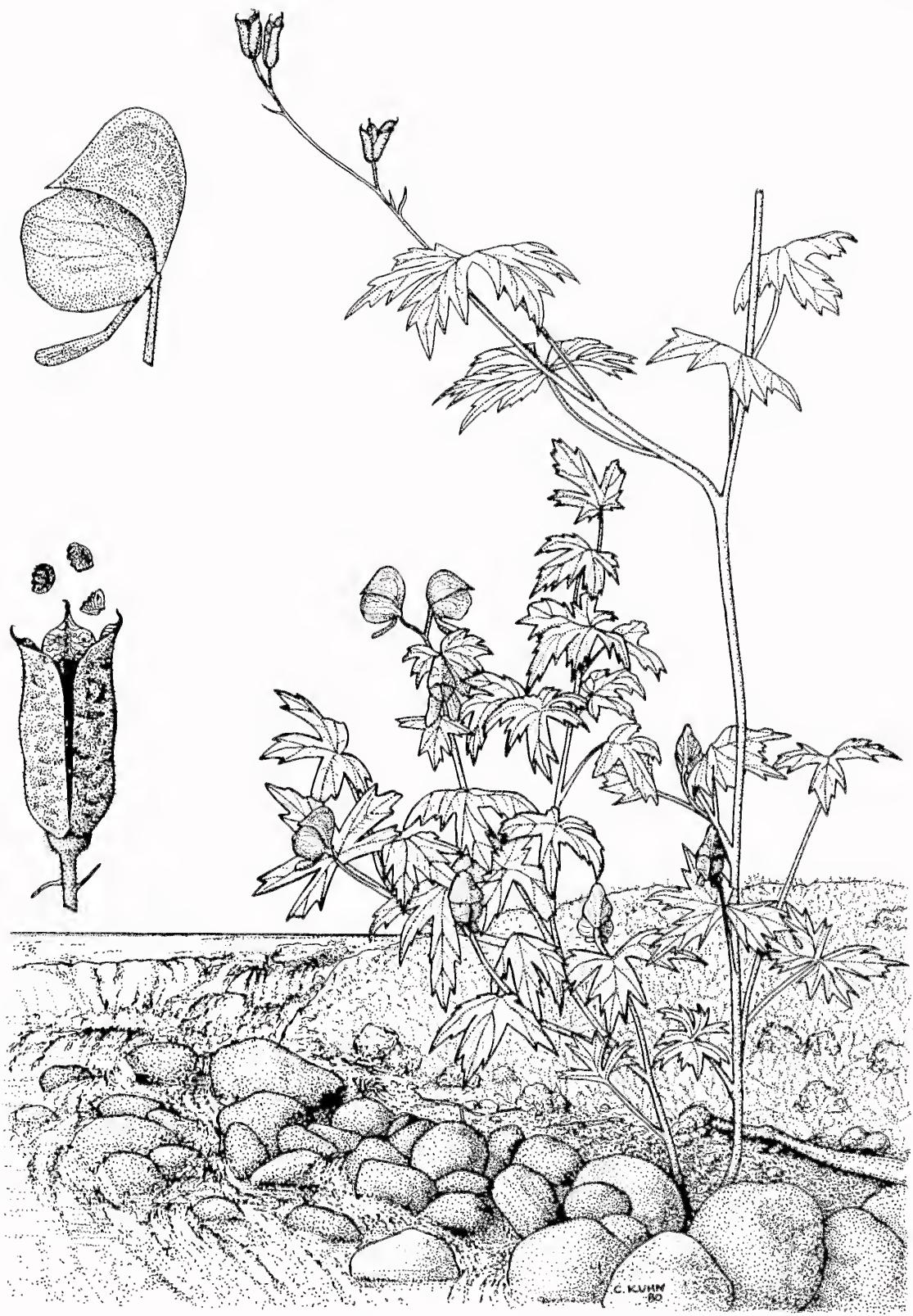
If you know the locality of a rare plant population of which this agency may not have been informed, please notify:
Office of the State Botanist
N. Y. State Biological Survey
3132 Cultural Education Center
Albany, New York 12230
Tel. (518) 474-5809

PREFACE

Over the past century, rapid industrial expansion, agriculture and increased housing needs have put considerable stress on natural plant communities. The importance of green plant associations must not be underestimated, since they provide the oxygen we breath and are sources of timber, energy, food, new medicines, and cultivated plants of the future. They alone can build soils and provide shelter for wildlife. Fragile biological communities stand at the very foundation of man's well-being, and these are able to thrive only if they remain diverse in numbers and kinds of plants and animals. Civilization has tended to promote the success of weedy, scrubby, and noxious plants, while eliminating the beautiful, the useful, and the rare from nature. This is not necessary. There are vast expanses of land the world over which can be cleared, burned, and further developed without measurable harm. In most cases, destruction of critical habitats is not intentional, but merely convenient or arbitrary, and might be avoided through cooperation between scientists, agencies, private owners and businessmen. It is also up to responsible biologists to identify endangered species and habitats and to alert potential developers to avoid their locations. Although conflicts will surely arise where profits are to be made, good information exchange in early planning stages can lead to proper land use without high costs. It is important for all of us to understand the economic and aesthetic reasons for preserving the diversity of plant and animal life in our State. This publication is dedicated to all those New York State citizens and visitors who believe that progress and prosperity may best be achieved without further destruction of unique wild places.

ACKNOWLEDGMENTS

We are particularly grateful to our colleague J. Kenneth Dean who worked with us throughout the intensive phases of this work. He has been a tireless field companion and excellent observer, from the top of Mt. Marcy to the tip of Montauk—from Buffalo to Barkaboom (so to speak). We wish to acknowledge the work of our predecessors at the New York Museum and their 140-year tradition of interest in the rarities of the State, beginning with Governor Marcy and John Torrey. Location of some of our rare plants would not be possible were it not for distribution-map files begun by Homer D. House over 65 years ago and kept current by Stanley J. Smith for some 30 years. Documentation of the present status of rarities was accelerated during the period of 1978–80, under contract with the U.S. Fish and Wildlife Service. We especially wish to thank Richard Dyer of their Endangered Species Office (Region 5) for his advice, administrative time and cooperation with us during the project. We are grateful to Winthrop Aldrich, James Beil and Elizabeth Wald of the State Department of Environmental Conservation for cooperation in many matters. Special thanks go out to all of our cooperators and participating botanists who number in the hundreds and cannot be listed here. Notable among the people who have put special effort into helping us in the field are: Mildred Faust, Orra Phelps, Babette Coleman Brown, George Nevin, Shirley Nevin, Robert Clausen, Betty Lotowycz, Bruce Gilman, Steven Eaton, David Hammond, Tim Barnett, Richard Zander, Bill Countryman and Karl Brooks. Deserving special mention are the two field botanists hired by The Nature Conservatory to study plant rarities in northern New York State. Tom Carrolan (1979) and Elizabeth Yanuck Platt (1980) both provided excellent information as a result of plant exploration in the Adirondacks and identification of significant habitats in need of protection. Finally, we would like to express our special appreciation to the more than 60 persons who attended our rare plant workshop in November 1979. The discussions and contributions of participants gave us many new insights and helped immeasurably in refining the State's rare plant list.



NORTHERN MONK'S-HOOD *Aconitum noveboracense*. These rare and beautiful plants were the first in New York State to be protected by federal law. The species, which derives its latin name from its discovery in New York, is known from fewer than 20 locations in the world. Illustrated here are fall plants which have fruited from July-August flowers and continue to flower after deer browse.

Introduction

NEW YORK STATE is a beautiful and diverse mosaic of habitats for animals, plants and man. It boasts the Adirondack and Catskill Mountains as well as the spectacular Hudson Highlands, and is rich in white-water rivers, trout streams and lakes. Two of the Great Lakes border New York State on the north and west, and the lower Hudson River represents a 150-mile tidal estuary. As a result of history, the State has a significant coastline on Long Island and deep-water ports at the mouth of the Hudson River. Limestone contact zones are frequent up the Hudson and along the Mohawk Valley to Lake Ontario, whose eastern shores form significant expanses of flatrock and natural limestone pavement. To the south, the glacially scoured Allegheny Plateau is cut by deep ravines and liberally supplied with waterfalls and finger-lakes.

As glaciers retreated some 15–16 thousand years ago, plants and animals began to invade the lands again. With such an abundance of habitats to populate, there is little wonder that a large variety of the survivors of that cool, wet (pluvial) period found niches in which to grow. Since the glaciers reached their southern limits on northern Long Island and in Cattaraugus County in western New York, it is likely that well-established forests were never far from the State's present borders. The re-vegetation of glaciated land, which continues even today, has been partly a matter of chance dispersal of seeds. Many plant distribution patterns are not easily explained, especially those of rarities; however, there are general consistencies in the relationships between plant growth-forms and succession onto barren lands.

We know that many species of plants from the Appalachians are hardy in cultivation north of the glacial terminus, and these may even invade our fields and forests to become naturalized. Invasion by these species might (or might not) have occurred in time without the intervention of man, but their success brings to mind the possibility, indeed the probability, that our flora is a young one, rich as it is. Given more thousands of years without glaciation, the flora of New York State will likely increase. This could happen through natural migration of southern and western species which would appear as rare species, then expand their ranges. Present rarities in our State are often of this immigrant type, barely hanging on to life in recently found suitable environments. Whether we choose to preserve their chance to survive and contribute to the richness of our heritage will reflect current generations' attitudes toward the natural world, and will inevitably affect the quality of life for all future dwellers in the State.

Extinction

When the last member of a species is lost or incapable of reproduction, that species and its genetic line are truly extinct. Rarity and extirpation are steps on the road to extinction. Extinction is not usually the result of competition within or between species. Until the advent of man, most extinction on land resulted from changes in climate and in the earth's crust. Today the wholesale destruction of tropical rainforest, for instance, brings permanent loss of species each day.

Extirpation

When a species is eliminated from a given area or ecosystem, it is said to be extirpated there. Extirpation has the effect of eliminating special individuals whose peculiarities might be the key to survival of the species when conditions change.

Rarity

The term rarity has a number of different interpretations and shades of meaning, some of which may be incorrectly applied. A species may be found only as scattered individuals, occurring here and there over a broad range. This is not the type of rarity to be discussed here. As used in this publication, rarity means the presence of few or widely scattered populations with regard to a given geographic area. One type of rare plant population, called a disjunct, is separated from the range of the rest of the species. This may be the result of recent long-range dispersal into new territory (an outlier) or the population may be a relict, left behind from a time when the species was more widespread. A species which is found only within a restricted geographic area is called an endemic. Endemic rarities are often known from islands, deserts and along disturbed coastlines, but are far less common in boreal and mixed hardwood forests, such as those of New York State.

This publication will treat in detail selected species of both State and national interest as well as some which are significantly disjunct in New York State. A provincial list of State rarities is included (Appendix II) to focus upon the need to preserve diversity, regardless of the distributions of species outside our State borders.

Causes of Rarity

Attempts to account for rarity lead the investigator from one enigma to another. There are so many reasons why a plant will not (or does not) grow in a given habitat, that it becomes more fruitful to discuss why each species occurs where it does. This may be equally frustrating, since studies combining ecology and physiology are still in their infancy. The following considerations relate directly to presence or absence of a species at a location:

DISPERSAL

Absence of a species from an apparently suitable habitat may be due to chance lack of dispersal of seeds or spores into the area. This is less likely with spores, since they are windborne and are produced in great numbers. Some seeds are wind-distributed, but many require special dispersal agents such as birds and mammals.

ESTABLISHMENT AND SEEDLING SUCCESS

Seeds and spores have different lifespans, depending upon the species. Conditions must be right in a given habitat to meet the dormancy, light, moisture, temperature and other requirements of a seed, or dispersal to that location is not significant. After germination, young plants are immediately in competition with other organisms for light, space, water and nutrients. The numbers and kinds of competitors in the vicinity of a seedling may profoundly alter its survival potential or even eliminate it in an otherwise suitable location. Many kinds of seedlings must establish a relationship (mycorrhiza) between their roots and special soil fungi in order to function efficiently. Absence of the symbiotic fungus can mean seedling death. Some parasitic fungi infect seedlings, causing "damping-off" and other fatal diseases. Browsing mammals, slugs and plant-eating insects offer additional threats.

COMPETITION

The term competition refers to the interaction of two or more organisms with similar growth requirements and needs for the same environmental resources. Though seedlings are most critically affected, plants are subjected to some sort of competition throughout their lifespans. The effects are negative by definition, and, if the needs of two species are extremely similar, one or the other will die out wherever they come in contact. Thus, a rare plant may be rare because it has been outcompeted by members of an-

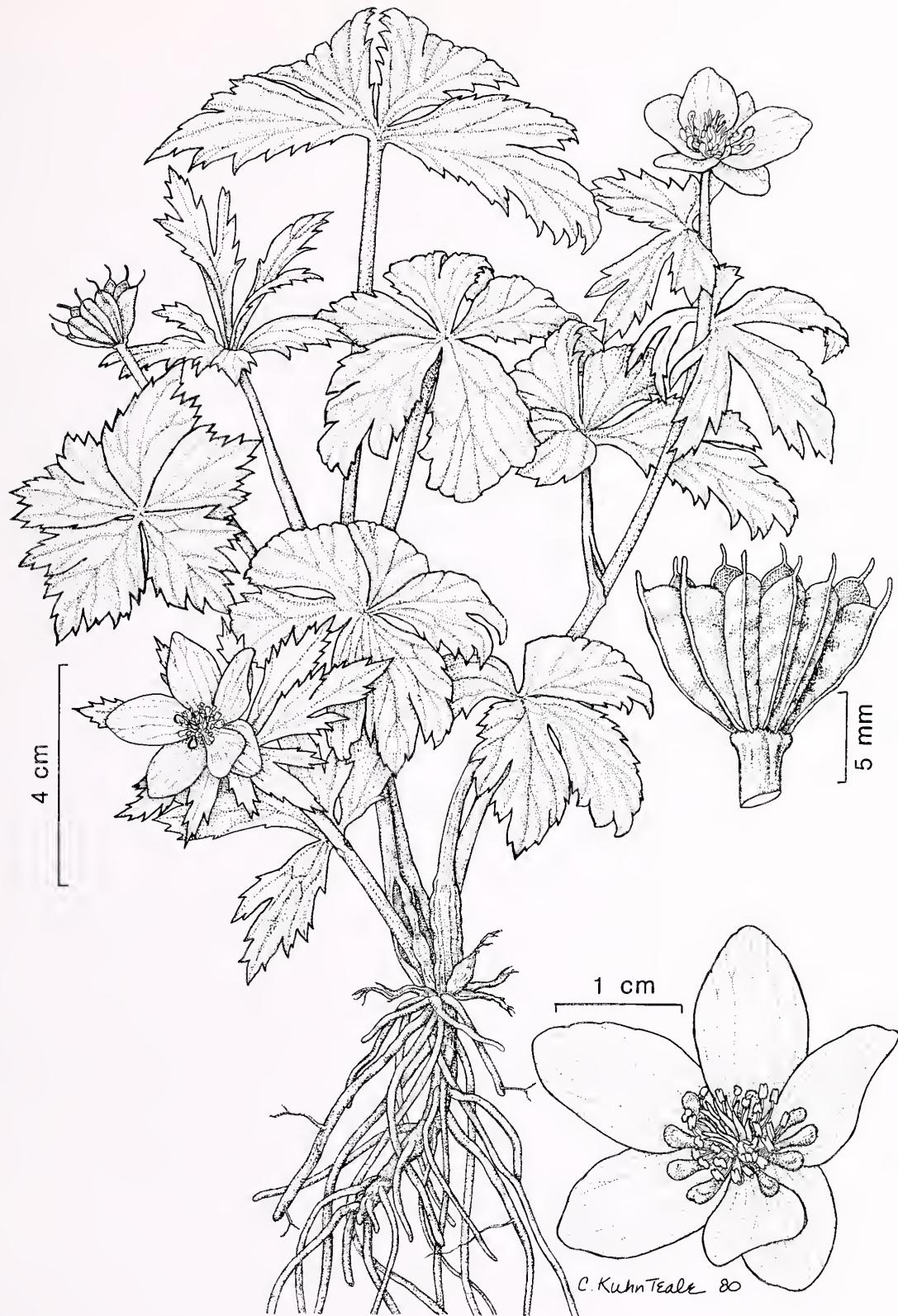
other species with similar needs; conversely a rare plant species may never have spread from the habitat in which it evolved, due to its inability to compete with established species. Given two competing species with the same needs, it may easily be seen that a single factor could tip the scale of advantage toward either. High copper content in soil might throw the advantage heavily toward a copper-tolerant, rare species. It would be incorrect of the observer to infer that this rare plant has copper-rich soil as its "preferred habitat". It merely survives there under conditions of reduced competition.

ADAPTATION

Seedlings of most species vary in their inherited characteristics and in their capabilities for surviving in various habitats. If a species produces many potential kinds of individuals with slightly differing needs and tolerances, it is said to be heterozygous, and has the potential to be widespread. Likewise, if most of the seedlings of a species are tolerant to a broad range of conditions, the species is said to be plastic, and also has good chance to be common. Rare plants are often lacking in significant differences between individuals (homozygous) and are not strongly plastic, though there are notable exceptions. Rarities frequently require rather specific habitats and have narrow ranges of environmental tolerance. This is particularly true of flowering plants and less so for conifers and their relatives. The ancient evolutionary lines are not necessarily depleted by lack of adaptability. The Maidenhair Tree (*Ginkgo biloba*) is an example of an ancient type of tree which is tolerant of a wide variety of conditions, including severe pollution. After 400 million years on this planet, during which it occurred on every continent, this tree became so rare that it is believed to have been saved only through cultivation by oriental priests. Today it thrives on city streets in almost any climate where it is planted.

REPRODUCTION

Plants which are rare may be so because of hindrance to their reproductive processes, especially if they evolved under conditions different from those which they now experience. Pollination mechanisms are varied, involving wind, water, insects, etc., and these can be crucial in establishment or survival of young or threatened populations. Some plant species are so closely tied to their specific insect pollinators that absence of the insects prevents reproduction by



GLOBEFLOWER *Trollius laxus* ssp. *laxus*. New York State is the only place where this yellow-flowered eastern subspecies is known to occur in numbers. One population of about 2,000 plants is known from the central part of the State, but this is exceptional. Usually a few plants seed into marly wet areas and are soon overgrown by swampforest.

seeds. This can be fatal in the case of annuals, which may not survive if they fail to set seed for a few years. Certain tropical ferns (like *Vittaria*) are known to occur in the Appalachian Mountains, but they do not develop fronds from their tiny, moss-like sexual stages; consequently they have only recently been discovered. This is a reminder that dispersal and establishment are not enough to insure success if conditions are not right for reproduction.

Vegetative reproduction is one way in which a rare plant can survive a hostile environment where it eventually might become adapted and reproduce sexually. Seed production without fertilization (apomixis) is known in some plant groups. Also, propagation by lateral growth or fragmenting (cloning) may favor better adapted individuals while others are dying out.

SUBSTRATE

Soils and exposed bedrock which serve as anchorage for plants also provide much of their moisture and nutrients. Acidity or alkalinity (pH) and a number of complex soil features involved in the exchange of ions make the number of possibilities for potential substrates very high. The sorting out of patterns of species on the land is the result of continuous interaction of soil factors, climate and individual plants. As stated above, some rare plants are found on exotic substrates. Their capabilities for tolerating unusual conditions in the soil have meant their advantage over less tolerant, common plants. Some species found only on serpentine soils are susceptible to damping-off fungi when grown on other soils, but such restriction of species to special soils is rare. Botanical gardens, attempting to create limestone gardens, have often found that plants brought in from calcareous areas escape readily to non-calcareous soils when there is little competition from other species.

CLIMATE AND MICROCLIMATE

Many features of climate, such as mean seasonal temperatures, maximum and minimum temperatures, frost dates, rainfall, prevailing winds, relative humidity and others, profoundly affect the distribution of plants and play a major role in the destinies of species. Restriction of distribution of plants by climate is difficult to assess, but not hard to understand intuitively. Within any climatic zone there is an intricate web of smaller microclimates, defined by such local limits as: wettest-driest, warmest-coldest, etc., with various combinations inbetween. Extreme mieroclimates in a given forest can simulate desert or tropics, or even arctic tundra, and likewise support speeies from those varied habitats if they should come in. Then why do we not find bizarre rarities from Africa and Alaska in

New York, occupying these niches which might currently support them? Dispersal is the first obvious barrier with seed plants. It is not a serious barrier with spore-reproduced plants such as ferns and mosses. In sporebearing plants a single species may be scattered in similar climatic zones around the world. Other factors are cyclic fluctuations of climatic conditions, and the evolution of new climates over continents as their surface features change. During a major climatic cooling cycle, the warmest, dryest microclimate in an area will probably exceed the tolerance limits of its desert-adapted inhabitants, eliminating them with moisture and cold; plants of extreme cold/moist microclimates will likewise be eliminated during warm/dry cycles. Thus, at any given time there will be extreme microclimates which do not support a flora reflecting their severity. Often such places are relatively bare. Rare plants may disperse from their restricted ranges into open spaces of this type. Where this has occurred, persistence of the colony is again threatened by inevitable climatic fluctuations. Repeated establishment and natural extirpation in such places must go on constantly, expanding and contracting the ranges of species.

Over great periods of time, mountain ranges rise and erode, and drainage patterns change across the continents, altering local climates through the configuration of the land. Where rainfall is low, as in the southwestern United States, north-south trending mountain ranges have profound effects upon climate, precipitating out moisture on their western slopes, leaving deserts in their eastern rainshadows. Such effects are less pronounced in the east, but they still change patterning and survival of plant and animal populations. Nearly everyone who has walked through a northern forest has noticed the greater abundance of mosses on the north side of tree trunks. Though it is not a hard and fast rule, this effect is produced by drying from the sun (detrimental to mosses) to which southern surfaces are more often exposed. Many effects and countereffects of far greater subtlety are continuously being produced—their complex interactions determining the ever-changing distribution of plants.

NEWLY EVOLVED RARITIES

Rarity may in some cases be attributed to the recent origin of the species involved. Two possible examples of this are New England Violet (*Viola novae-angliae*) and Houghton's Goldenrod (*Solidago houghtonii*). Both species are known only from recently glaciated lands and have probably evolved in the last 15 thousand years. Houghton's Goldenrod has arisen through hybridization with a subsequent increase in the number of chromosomes. Indeed, New York plants probably

arose separately from those in Michigan and Canada, and may represent a new species, endemic to western New York. Sites containing such rarities may be considered natural "evolution laboratories", and should receive protection as such.

CHANCE

The chance that conditions will remain stable at any location for a long period of time is extremely small. Earth history has been characterized by both gradual and violent changes in recent as well as ancient times, and such processes will surely continue in the future. Plants which do not adapt to change or do not continually disperse into favorable conditions are doomed to severe range restriction and extinction as a result of chance events.

MAN'S INTERVENTION

The human species is largely a product of the Pleistocene, a period of catastrophic climatic fluctuation. Over a period of one to two million years, the earth repeatedly cooled and warmed; glaciers spread over vast areas, contracted and receded, only to form again. Forests shrank and were replaced by grasslands and deserts. It was a period during which only the most adaptable could survive. Man's developing mental capacity, stimulated by the challenges presented by Pleistocene environments, dramatically increased his adaptability, setting him apart as the species most able to alter environments to his own needs. The use of his opposable thumb and the extension of his arm and grip through the invention of tools gave man a striking competitive advantage, and allowed the spread of the species from its African birthplace to cover, and in many ways conquer, the earth's surface.

Sometime during the last major glacial stage (Wisconsinan), bands of hunters crossed into Alaska from Asia. Their descendants pressed southward and eastward, hunting the remaining great ice-age mammals as well as smaller game. Recently it has been proposed that the hunting pressure from these early North Americans was enough to cause extinction of the great Pleistocene mammals. This theory is sharply debated, but if it is correct for even a single species it means that extinction at the hands of man began on this continent thousands of years ago.

By the time Europeans discovered the Americas, the American Indians—ultimate descendants of the original Asian immigrants—had thoroughly occupied North America and established a successful equilibrium with the fauna and flora in most places. Under conditions of primitive technology, low population levels and some migration, Native Americans had little more impact than natural predators. That is not to sug-

gest that they did not affect the biota, especially at the local level. Over some extensive areas burning regimes altered vegetation and maintained fire-climax associations of plants and animals. Disturbance attendant with camp life and agricultural practices provided niches for rare species as well as promoting the development of "camp-following" native weeds.

With European settlement, the face of the land began to change drastically. Europeans, rooted in an agricultural heritage and coming from manicured and orderly landscapes, arrived on the North American continent with a strong will to alter the wilderness. Despite initial hardship and drawbacks, they began a steady conversion of natural vegetation areas to farmlands and yards. Even today, with increased environmental awareness, there is the prevailing attitude among North Americans that progress is inescapably linked with destruction of wild places. This amounts to a serious prejudice against our national heritage, of which nearly every one of us has been guilty at some time.

Less obvious factors arising from human population of the landscape may be no less serious threats to species than the catastrophic clearing of land. The pervasiveness of chemical contaminants in the environment has only recently come to be appreciated. Pesticides indiscriminately kill desirable species along with the pests which they were developed to control. More subtle are the effects of accumulation of toxins in biological food chains. The relationship of DDT to the decline of birds of prey is perhaps the best known. Pesticides are not unique, however, as evidence of PCB's had demonstrated. While some chemicals destroy life directly, fertilizers and sewage, leached or discharged into lakes and streams, promote the enrichment of these waters and lead to the extirpation of many native, freshwater species. Introduction of alien species by man can put native plants and animals at a definite disadvantage in competition. A good example of this is the invasion of thousands of marshes, lakes and bogs in New York State and elsewhere by Purple Loosestrife (*Lythrum salicaria*). Though this introduced plant is beautiful itself, its crowded, hummocky growth eliminates fragile, native vegetation at an alarming rate. The same is true of Japanese Honeysuckle (*Lonicera japonica*) and Kudzu Vine (*Pueraria lobata*) further south. Two large grasses currently rendering havoc on New York State's wetlands are Common Reed (*Phragmites communis*) and Reed Canary Grass (*Phalaris arundinacea*).

The human hand, then, may be blamed for much rarity and elimination of native plants and animals. Perhaps too much has already been said on this subject and too little thinking and serious planning done on how to co-exist with remaining natural communi-

ties. As reasoning beings who are also perpetrators of global mayhem, we find ourselves in a dilemma. Some conservationists might insist that manipulating environment is not desirable, and that destabilizing effects from management and experimentation may bring the extinction of the very species we seek to protect. Although this is a risk, lack of management for many rare associations will also bring their demise. Few communities containing rare plants are part of cli-

max vegetation, so natural succession on sites they now occupy would mean their eventual replacement and extirpation. Though we cause much disturbance, we also remove causes of natural disturbance such as fire, stream-capture, flooding and earth slides from many areas where they once frequently occurred. Plant communities which are adapted to pioneering after such events must have those disturbances simulated or lose their suitable habitat.

Rarity and the Law

Plants belong, by law, to the landowner, whether that might be an individual, a corporation or government agency. Animals, on the other hand, have traditionally been owned by the king or government, with strong precedents passed on from British common law.

The environmental awareness of the public has increased greatly in recent years and prompted the enactment of much significant legislation. One product of Congressional activity is the Endangered Species Act of 1973. The Act was devised to prevent the extinction of plants and animals, and it addresses problems of both exploitation and habitat destruction. The Act defines an endangered species as any species of animal or plant which is in danger of extinction over all or a significant portion of its range. A threatened species is defined as one which is likely to become endangered. According to the Act, a species may become endangered or threatened through one or more of the following factors:

- 1) The present or threatened destruction, modification or curtailment of its habitat or range;
- 2) Overutilization for commercial, sporting, scientific or educational purposes;
- 3) Disease, predation;
- 4) The inadequacy of existing regulatory mechanisms;
- 5) Other natural or man-made factors affecting its continued existence.

Additional definitions indicate that all life forms are intended to fall within the scope of the Act, excepting only specific insects which present severe threats to man. Definitions further provide for the coverage of any individual, whether alive or dead, and any parts, and, in the case of animals, products derived from them.

The Act addresses exploitation of endangered species by prohibiting their trade in interstate and foreign commerce and their import and export. Further, the "taking" of endangered animals is prohibited, "taking" being defined to include the killing, capture and harassment of individuals. The Act provides for the formulation of regulations concerning endangered and threatened species and prohibits the violation of such regulations; penalties are provided for civil and criminal violations of the provisions of the Act.

A particularly important section of the Act promotes the conservation of habitats of endangered and threatened species. The Act authorizes the acquisition of land for the protection of habitats of these species and directs federal agencies to insure that their activities or those authorized or funded by them do not jeopardize the continued existence of endangered and threatened species.

The Act also implements the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which prohibits or regulates trade in designated species between signatory countries.

The Act prescribes strict procedural guidelines for determination of status and listing of species. These provide that species be listed only after extensive input and review by biologists, the states and the general public. This procedure insures that only species in need of protection are listed, and it provides baseline data from which further population monitoring may proceed. It does, however, take a great deal of time, and the process has been particularly slow with plants. Many of the over 3,000 species may indeed become extinct before they are considered for federal protection. This places responsibility with state and local governments and with those individuals who own the land.

New York State Rarities Considered for Federal Protection

Under the provisions of the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service periodically publishes notices on species under review for federal listing. The latest such notice at the time of this publication was the *Federal Register*, vol. 45, no. 242, Monday, December 15, 1980. That publication was in part the basis for Table 1.

TABLE 1. FEDERAL STATUS OF NEW YORK STATE PLANT RARITIES (1981)

Status	Species	Common Name	Historical Distribution
LISTED THREATENED			
	<i>Aconitum noveboracense</i>	Northern Monk's-hood	IA, OH, NY, WI
PROPOSED ENDANGERED			
	<i>Isotria medeoloides</i>	Small Whorled Pogonia	CT, IL, ME, MD, MA, MI, MO, NH, NJ, NY, NC, PA, RI, SC, VT, VA, (CANADA)

UNDER REVIEW

Category 1—Species for which there is sufficient information on hand to support their listing as Endangered or Threatened

<i>Plantago cordata</i>	Heart-leaf Plantain	AL, GA, IL, IN, MI, NY, NC, OH, WI
<i>Platanthera leucophaea</i>	Prairie White-fringed Orchid	AR, IL, IN, IA, KS, LA, ME, MI, MN, MO, NE, NY, ND, OH, OK, SD, VA, WI, (CANADA)
<i>Solidago houghtonii</i>	Houghton's Goldenrod	MI, NY, (CANADA)
<i>Trollius laxus</i> ssp. <i>laxus</i>	Globeflower	CT, NJ, NY, OH, PA

UNDER REVIEW

Category 2—Species which are candidates for listing pending further information on their status

<i>Agalinus acuta</i>	Gerardia (False Foxglove)	CT, MA, NY, RI
* <i>Bidens bidentoides</i>	Bur-marigold	DE, MO, NJ, NY, PA
<i>Calamagrostis perplexa</i>	Wood Reedgrass	NY
<i>Cardamine longii</i>	Long's Bittercress	ME, MD, NY, PA
<i>Helianthemum dumosum</i>	Bushy Rockrose	CT, MA, NY, RI
<i>Helonias bullata</i>	Swamp Pink	DE, GA, MD, NJ, NY, NC, PA, VA

* Too frequent in New York State to be listed threatened under our guidelines.

<i>***Isoetes eatonii</i>	Eaton's Quillwort	CT, MA, NH, NJ, NY
<i>Listera auriculata</i>	Auricled Twayblade	ME, MI, MN, NH, NY, VT, WI
<i>Micranthemum micranthemooides</i>	Micranthemum	DE, DC, MD, NJ, NY, PA, VA
<i>Narthecium americanum</i>	Yellow Asphodel	DE, NJ, NY, NC, SC
<i>Phyllitis scolopendrium</i>	Hart's-tongue Fern	AL, MI, NY, TN, GA, (CANADA)
<i>Poa paludigena</i>	Slender Marsh Bluegrass	IL, IN, MI, NY, OH, PA, WI
<i>Potamogeton hillii</i>	Hill's Pondweed	CT, MA, MI, NY, OH, PA, VT (CANADA)
<i>Potamogeton lateralis</i>	Pondweed	CT, MA, MI, MN, NH, NY, VT
<i>Prenanthes boottii</i>	Boott's Rattlesnake-root	ME, NH, NY, VT
<i>Schizaea pusilla</i>	Curlygrass Fern	NY, NJ (CANADA)
<i>Schizolbea americana</i>	Chaffseed	CT, DE, KY, LA, MD, MA, MS, NJ, NY, SC, TN, VA
<i>Scirpus ancistrochaetus</i>	Northeastern Bulrush	MA, NY, PA, VT, VA
<i>Scirpus longii</i>	Long's Bulrush	CT, ME, MA, NJ, NY
* <i>Valeriana uliginosa</i>	Marsh Valerian	IL, IN, ME, MI, NY, OH, VT, (CANADA)
<i>Viola novae-angliae</i>	New England Violet	ME, MI, MN, NY, WI
<i>Woodsia oregana</i> var. <i>cathcartiana</i>	Cathcart's Woodsia "Oregon Woodsia"	MI, MN, NY, WI, (CANADA)

DELETED FROM REVIEW

Category 3B—Species eliminated from consideration on taxonomic grounds: those not meeting the Act's definition of "species"

<i>***Panicum aculeatum</i> = <i>P. scabriusculum</i>	Panic Grass	NY, RI to FL, TX
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DELETED FROM REVIEW

Category 3C—Species eliminated from federal consideration because they were found to be commoner or less threatened than formerly believed.

<i>Calamagrostis porteri</i>	Reed Grass	KY, NY, NC, PA, VA, WV
<i>Cypripedium arietinum</i>	Ram's-head Ladyslipper	CT, ME, MA, MI, MN, NH, NY, VT, WI
<i>Cypripedium candidum</i>	Small White Ladyslipper	IL, IN, IA, KY, MI, MN, MO, N.E., NJ, NY

* Too frequent in New York State to be listed threatened under our guidelines.
*** Taxonomic problems.

* <i>Hydrastis canadensis</i>	Golden-seal	VT to N.E. south to AL & GA
** <i>Muhlenbergia torreyana</i>	Torrey's Muhly	DE, GA, KY, NJ, NY, TN
* <i>Panax quinquefolius</i>	American Ginseng	ME to MI, OK, south to LA, (FL)
* <i>Platanthera flava</i>	Southern Rein Orchid	ME to MI south to GA & TX
<i>Primula mistassinica</i>	Bird's-eye Primrose	IL, IA, ME, MI, MN, NY, VT, WI (CANADA)

Concentration of Rare Plant Species

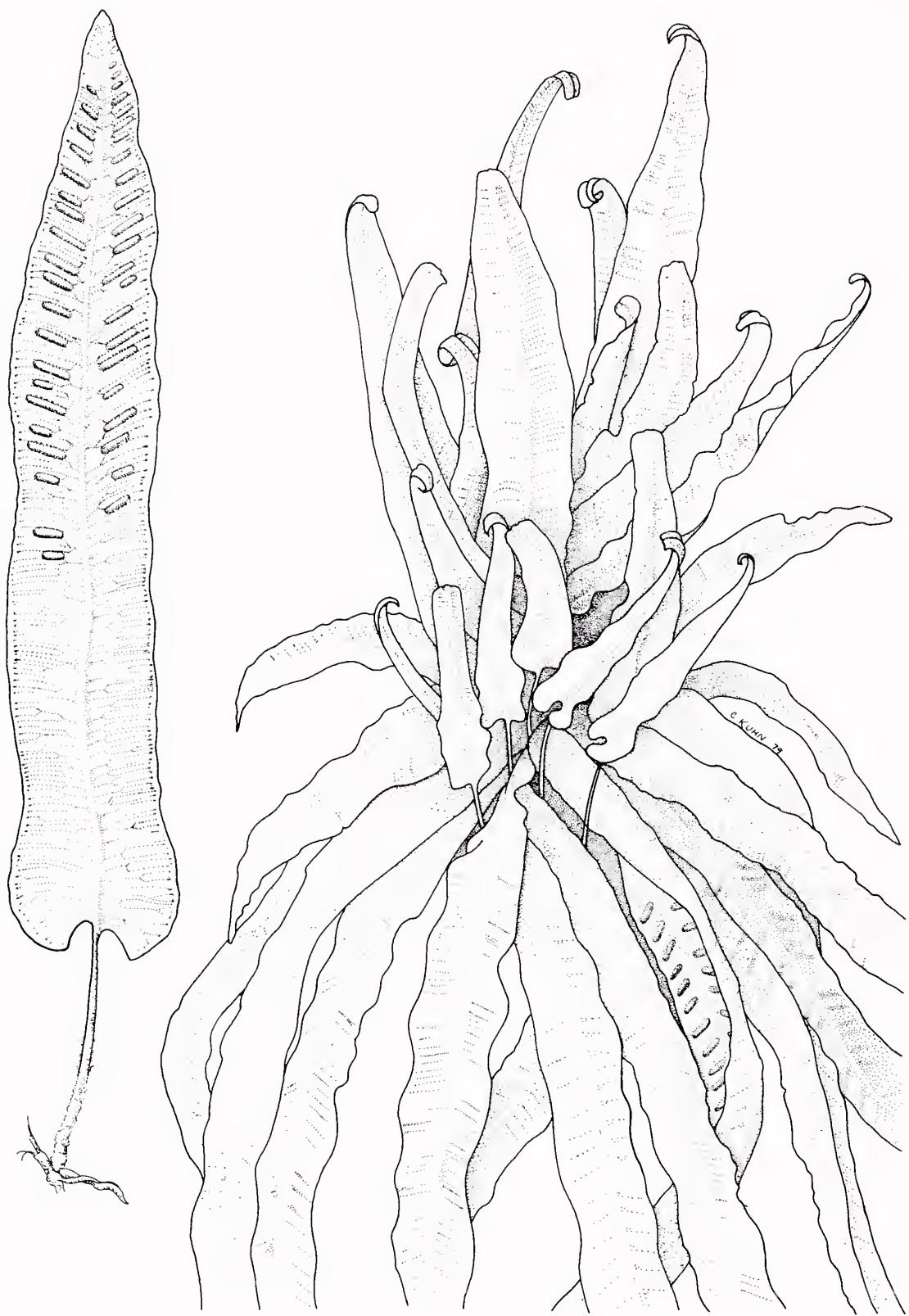
Due to special physiography, climate and substrates offered to migrating plants, certain regions have become centers of concentration of New York rarities. With oscillations in climate through time, countless populations have come and gone. During warming and drying trends after the last glacial period, arctic species dispersed northward through New York State while their southern populations were dying out under stress. This northward migration continued, such that the State is now too far south to provide suitable habitats for most of those species. In a number of cases, however, arctic relicts survive in cold places like canyons and crevices in high peaks. Other, more western species migrated far from their former ranges onto the glacial rubble and now persist as relicts in limestone areas where there may be less competition from common, local plants. As warming and drying of the over-

all climate continued, coastal plain and estuary dwellers from the south, as well as prairie plants from the midwest, migrated in. Some of these established themselves on Cape Cod or further northeast, but many are at their northeastern limits on Long Island. A warming trend reached its maximum (called the alithermal) about 5,000 years ago and subsequent cooling has resulted in contraction of the ranges of some species which were making advances to the northeast. Such major and minor climatic cycling will undoubtedly continue to be accompanied by plant dispersal, establishment and eventual extirpation with regard to any given geographical area.

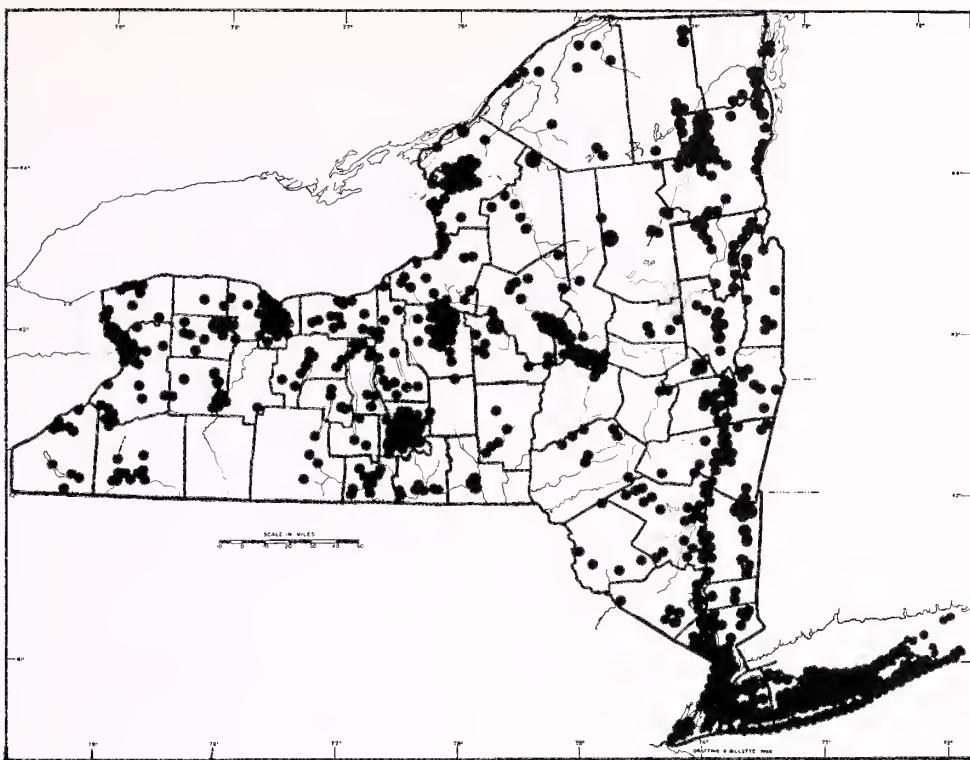
The following is a listing of significant areas of rare plant concentration in New York State, both past and present. For a map of the known occurrences of plant rarities in the State, see Map 1.

* Too frequent in New York State to be listed threatened under our guidelines.

** This species was once again being federally considered for listing at the time of this publication due to new information on its rarity.



HART'S-TONGUE *Phyllitis scolopendrium*. These unusual ferns grow in limestone areas, particularly around cliffs. They are particularly vigorous plants where they survive in New York State, but historically have been attacked by everything from the gardner's shovel to dynamite. The illustration shows new fronds unfolding to a height of about a foot.



Map 1. Historical occurrence of rare plants in New York State, showing areas of concentration. Many of these are in urban areas, with the highest concentrations of New York State rarities on Long Island.

AREAS OF HIGH EXTIRPATION

It is ironic that aggregations of rare plants and animals are often known from areas which develop into urban centers. This fact, coupled with the high rate of occurrence of rare plants near universities, has led some to speculate that we are mapping the activities of plant collectors rather than the true distribution of species. Although thoroughness of collection in an area should not be discounted, intensive local flora studies of parks or counties turn up little in the way of rarities where rarities were not already known. In addition, the areas where rarities are concentrated were well documented long before human population and land development became major factors in environmental degradation.

New York City Area—Early catalogs and descriptions portray this area as one of great beauty and diversity of species, forested for the most part, but liberally dotted with small lakes, meadows and marshy areas. Old records are rich in reports of species which used to range into the State, listing such sites as Manhattanville and Aqueduct for marsh plants. Some rarities still persist in the Bronx and on western Long Island. Nassau County, Long Island, once had a prairie—the Hempstead Plains. This was an extremely rich associa-

tion of rare plants, of which a tiny remnant remains. Staten Island is perhaps the area in which the most rare species for New York have been extirpated. It is fortunate that many of these were merely northern range limits for species commoner further south. Areas to the north of the city in Westchester and Rockland Counties have been less heavily impacted, but development continues.

Buffalo-Niagara Gorge Area—This region has been highly disturbed, and a number of species which were characteristically western have been eliminated. Small White Ladyslipper (*Cypripedium candidum*), for instance, was formerly known from an island in the Niagara River which is now occupied by sewage treatment facilities. Further exploration of the less accessible parts of the gorge may turn up a few of the plant species which we now fear may be extirpated there.

Black River, Watertown Area—The limestone cliffs of this river once supported populations of a number of western species, notably Prairie Smoke (*Geum triflorum*) and Cut-leaved Anemone (*Anemone multifida*). Industrialization brought changes along the riverbanks from mid- to late-19th century, and extensive dam building in conjunction with mills (mostly

now in ruins) may be blamed for extirpation in the vicinity of the cliffs and banks. Intensive searches by field botany teams have revealed only a weedy flora adjacent to the river, though the flatrock areas surrounding it are still rich in rarities in some places, as will be discussed below.

Rochester Area—Particularly in aquatic situations along and near the Genesee River, there are a number of reports of rare plants, some of which have not been verified for 120 years; some of these are certainly gone, but the search continues for survivors.

Syracuse Area—The limestone-rich, dissected topography, combined with alkaline lakes and marly bogs, once made the Syracuse region one of our richest in rare plants. Although much extirpation has occurred, there are many habitats still intact and in need of preservation, especially southeast of the city. Land fills, mining and the draining of bogs have been major causes of loss of critical habitats. Housing developments now present an even greater threat, as in most growing, urban areas.

Utica Area—Extensive marshy areas around Utica were once rich in rare plant populations. As in Syracuse, there are still such areas which have not been drained or sufficiently disturbed to destroy all of the rare plants.

AREAS OF UNCERTAIN FUTURE

Eastern Long Island Area—This extremely important area was refuge for the largest number of New York State rarities anywhere assembled. The two most important centers are: 1) northern Suffolk County from Port Jefferson to Riverhead, and 2) the entire southern peninsula from Flanders to Montauk Point, with special emphasis on the Sag Harbor and Montauk areas. Rarities concentrated in these areas not only represent migrants from the south, but some are extremely rare Coastal Plain species, under review for Federal protection.

Hudson River—From its mouth to the Albany-Troy region some 150 miles north, the Hudson River is an estuary under tidal influences. Its marshy and muddy shores offer a great variety of aquatic habitats, and are populated, as might be expected, by a number of rare plants. Threats to rarities from dredging are usually minimized by hearings and careful environmental impact statements. This is particularly important on the Hudson, since certain peripheral marshes and creek mouths harbor some of the rarest plants in New York State and in the nation.

Mohawk Area—The zone between Utica and Cherry Valley is a critical one for rare plants. It is located mostly in southern Herkimer and northern Otsego Counties. Particularly in calcareous, swampforest

zones, there are known extant populations, sites of extirpation and potential sites for discovery of rarities.

Watertown Flatrock Area—Natural limestone pavement is common along the eastern shores of Lake Ontario, especially to the west of Watertown. Most of these lands are barren and devoid of significant vegetation, but pockets are to be found in which a number of rare plants are associated. Prairie bunch-grass and sedges carpet small swales.

Tompkins County-Cayuga Lake Area—Partially because of intensive plant collecting (Cornell University), but more significantly because of the superposition of an impressive array of calcareous habitats, the Cayuga Basin and adjacent Tompkins County comprise a well-known rare plant center. The marly marshes and swales are constantly in danger of being drained or filled, and lakeshore plants are equally in peril. Cliff dwellers are afforded some degree of protection within parks, but remain in danger on private land. Extensive botanizing in the three counties to the south and east by the botanist Stanley J. Smith failed to reveal the richness of rarities found in Tompkins County and the Cayuga Lake Basin.

The Glen Area—This important rare plant area lies along the upper Hudson River in Warren and Essex Counties.

Bonaparte Swamp—Northern Lewis County, particularly the swampforest area, is also rich in rarities.

Pine Plains—The sandy, marly area in northern Dutchess County is also rich in plant rarities.

AREAS AFFORDED SOME PROTECTION

Bergen Swamp—This area has received much attention from botanists and zoologists, and is protected by the Bergen Swamp Society (private ownership). Poaching still occurs and should be highly discouraged by all before the area loses more of its marl-bog flora.

Valcour Island—This lime-rich island in Lake Champlain has long been known for its New York rarities. The Nature Conservancy purchased much of the southern end of the island, and now most of the island is under control of the State of New York. Limited accessibility and State supervision afford good prospects for protection if the area is not developed for further recreation.

The High Peaks—The Adirondack Peaks are rich in arctic-alpine flora, members of which are rare in New York State or at their southern limits of distribution. Most of the land is State-owned and supervised. The main threats to alpine vegetation are from hikers who trample the summits; in spite of this, a number of rarities are hanging on to life.

Status Code for New York State Rarities

The status code used here does not have a basis in New York State law at the time of this publication. It is a form of designation proposed by the authors to indicate both rarity and need for protection for each species listed. The two-symbol code separates actual rarity from desired protection priorities, since these do not always coincide. The letter indicates rarity status as follows:

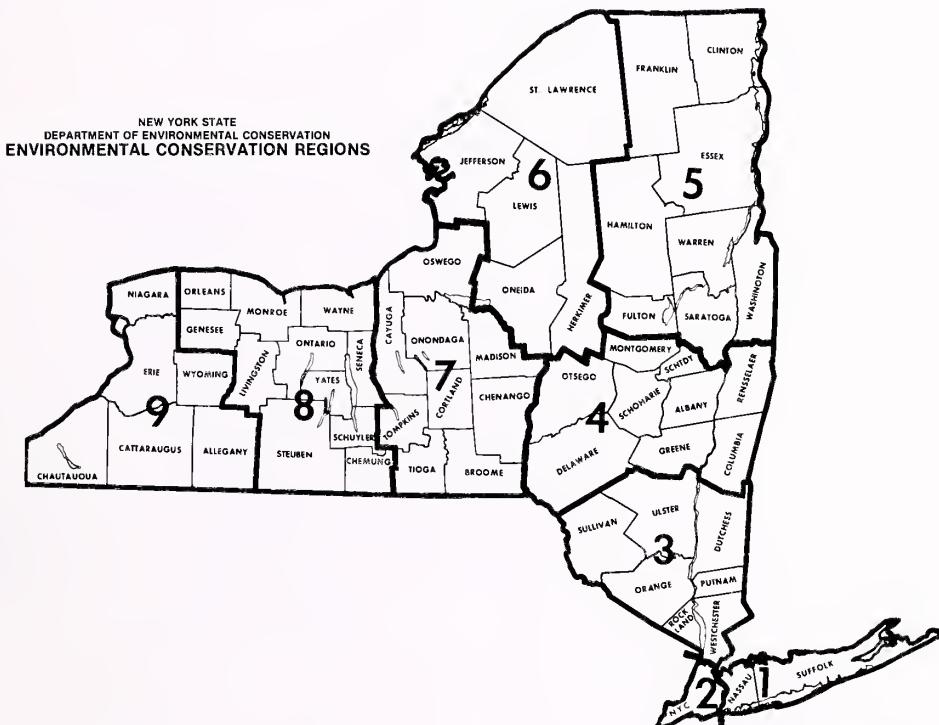
- X — probably extirpated in New York State
- E — endangered in New York State
- T — threatened in New York State
- C — commercially exploited in New York State

The numbers indicate recommended priority for protection, whether by law or by conscience of the land owner. These were derived through consideration

of overall rarity and pattern of distribution of the species, as well as likelihood of extirpation within and outside the State. High priority has been assigned to those species studied federally and found to be endangered or threatened on the national level. Numerical priorities are:

- 1—highest priority; protection should be mandatory
- 2—protection strongly recommended, even if the habitat supports no other rarities
- 3—protection recommended if in combination with other rare species

Thus, E-1 has the highest priority followed by T-1, E-2, T-2, E-3 and T-3. Plants listed X-1, X-2 or X-3 would take on new numerical designations E-1, T-1, etc. if rediscovered.



Map 2. Counties of New York State and the Districts (Regions) of the New York State Department of Environmental Conservation (D.E.C.) referred to in the text.

Rare Ferns of New York State

The Pteridophytes comprise the group with the largest number of rarities in New York State. Because they reproduce by windborne spores, the likelihood of long distance dispersal is great for them. Thus, species from western North America may occasionally establish in the east when their spores are carried by prevailing winds to suitable conditions. In addition, arctic

ferns have established in severe habitats in the Adirondacks and in extreme cold air drainage zones in the deep Catskill cloves. The fifteen ferns described and pictured here are known to occur nine times or fewer in New York State, and represent some of the most endangered members of our flora.

MOUNTAIN SPLEENWORT

Asplenium montanum Willd.

Status:	Threatened in New York State (T-3)
Rarity:	These plants are very rare in New York and New England, but less so in the central and southern Appalachians where they range to Georgia.
Habitats:	Soil in crevices of acid rocks such as sandstone in protected, frequently shaded places. The soil pH is often 4-6.
D.E.C. Region:	3
Counties:	Dutchess, Ulster

This small fern has its fronds pinnately divided with the leaflets (pinnae) cut and lobed. The leaf stalk (stipe) is greenish above and brown below, and is not scaly or hairy. Species with which it might be confused are: Wall Rue (*A. ruta-muraria*), whose stipes are all green and whose leaves have fewer pinnae, and Green Spleenwort (*A. viride*) which has hair-like scales on the leaf stalk. It also looks a little like Fragile Fern (*Cystopteris fragilis*) but does not bear its spore clusters (sori) near the margins of the pinnae.

GREEN SPLEENWORT

Asplenium viride Huds.

Status:	Threatened in New York State (T-3)
Rarity:	This species is rare at its southern limits in the eastern United States and Canada, but it has a wide range to the north extending to Alaska, Eurasia and Greenland. In the Western U.S. it is found south to Colorado and Washington State. Green Spleenwort has been found at a single locality in New York State and is equally rare in Maine and Vermont.
Habitats:	Soil in crevices of limestone areas, especially cliffs and talus, often in

partially shaded situations. Soil pH is neutral to slightly basic.

D.E.C. Region: 6

County: Lewis

This slender fern has pinnately divided fronds with toothed or shallowly lobed pinnae. Like the Mountain Spleenwort its leaf stalks are green above and brown toward the bases. The pinnae are not as deeply divided, however, and the leaf stalks have brownish, hair-like scales. Sori are narrow, borne near the midribs.

MOONWORT

Botrychium lunaria (L.) Sw.

Status:	Endangered in New York State (E-3)
Rarity:	These plants are known from a single population in the State where they are extremely vulnerable. The other two sites from which they were known have been destroyed. The species is a widespread one, ranging to Alaska, Eurasia and Australia, but rare in the eastern United States.

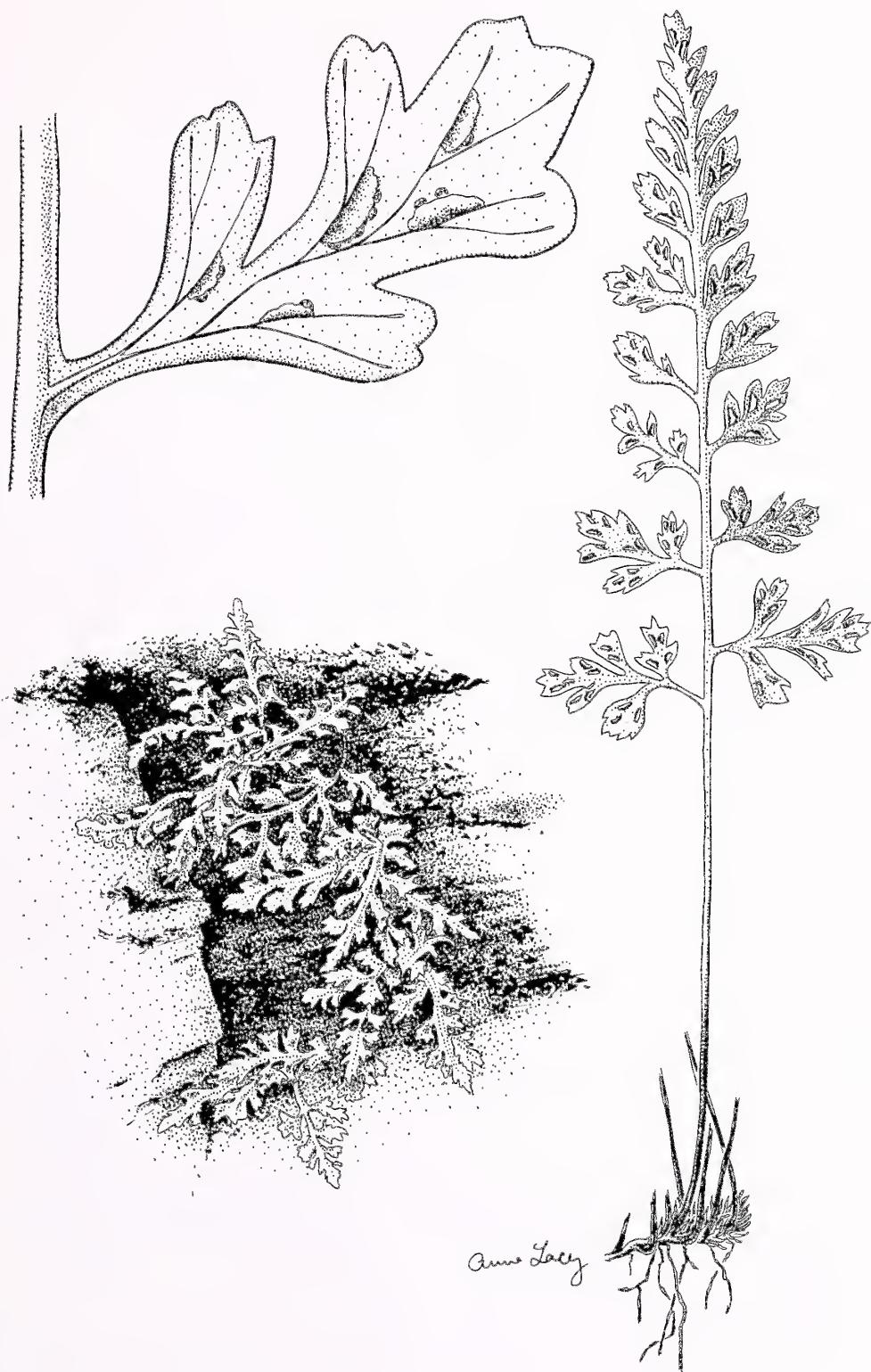
Habitats:

Limestone areas (mixed hardwood-conifer woodland in New York) in tundra, talus, meadows, woods or on shores. Soil is neutral to slightly alkaline.

D.E.C. Region: 7

County: Onondaga

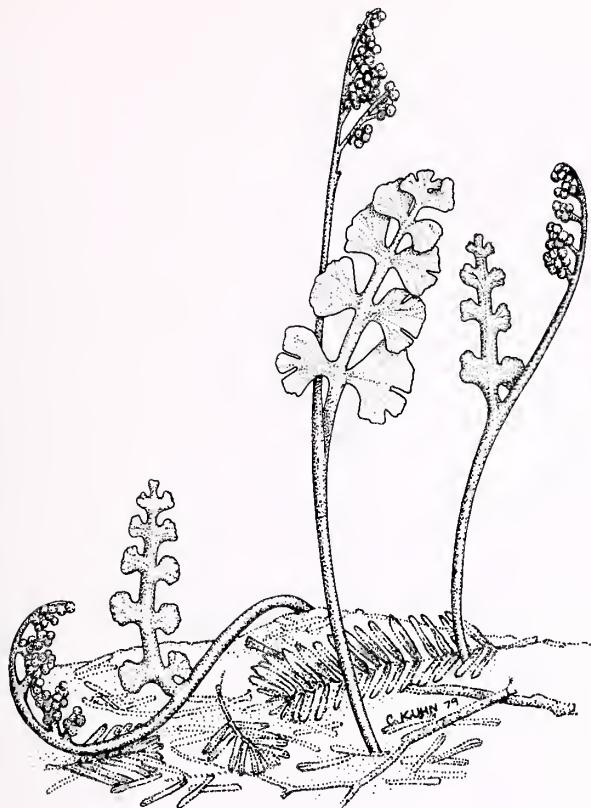
These tiny plants consist of a fertile segment and a simple vegetative leaf borne on a common stalk. The fertile stalk has branches near the tip which bear clustered sporangia. The leaf is pinnately divided with fan-shaped leaflets (pinnae). The plants are only visible for a couple of months each summer, as they wither soon after shedding spores. They may easily be confused with Mingan Moonwort with which they may grow in mixed colonies (see below).



MOUNTAIN SPLEENWORT *Asplenium montanum*.



GREEN SPLEENWORT *Asplenium viride*.



MOONWORT AND MINGAN MOONWORT

Botrychium lunaria; *Botrychium minganense*. The tiny Moonworts were once known from three locations in the State, but now persist at only one location with fewer than 40 individuals. Moonwort (center) sometimes grows with its (polyploid) relative, Mingan Moonwort (left and right).

MINGAN MOONWORT

Botrychium minganense Victorian

Status: Endangered in New York State (E-2)
 Rarity: These plants are known from the same single colony, mixed with the above species. The plants have a range similar to that of Moonwort, often occurring with it. This species is extremely rare in the eastern United States.

Habitats: As with the species above

D.E.C. Region: 7

County: Onondaga

This species has twice the number of chromosomes of the Moonwort. Though closely related to *B. lunaria*, it may be distinguished by the shape of pinnae (compare in figure above), its fleshier texture and larger spores.

TERNATE GRAPE FERN

Botrychium ternatum (Thunb.) Sw.

Status: Threatened in New York State (T-2)
 Rarity: This species has been found in three locations in New York State. Specimens were on sheets mixed with other species of *Botrychium*, indicating that they grow together. It is a northern species, not well understood by botanists in general, and may be more common in Canada than presently known.

Habitats: Open woods and clearings in organic to gravelly soils, often in acidic situations.

D.E.C. Regions: 6, 7

Counties: Onondaga, St. Lawrence

These plants have a fertile segment and a single leaf borne on a common stalk. The fertile stalk is profusely branched at the tip with copious sporangia. The leaf is much divided and lobed. This species is much like the Leathery Grape Fern (*B. multifidum*), but has many small, sharp teeth on the lobes of the leaflets.

WOOLLY LIP-FERN, HAIRY LIP-FERN

Cheilanthes lanosa (Michx.) Eat.

Status: Possibly extirpated (X-3) in New York State (last reported 1888).

Rarity: Very rare in New York and Connecticut, but less so further south and in the midwest. Ranging mostly from New Jersey and Pennsylvania to Arkansas and Kansas. This species should be actively sought in the southernmost counties in New York. Relatively dry, rocky sites, such as ledges and cliffs; found on a wide range of soils, from those derived from acidic sandstone to basic limestone.

Habitats: D.E.C. Regions: 2, 3

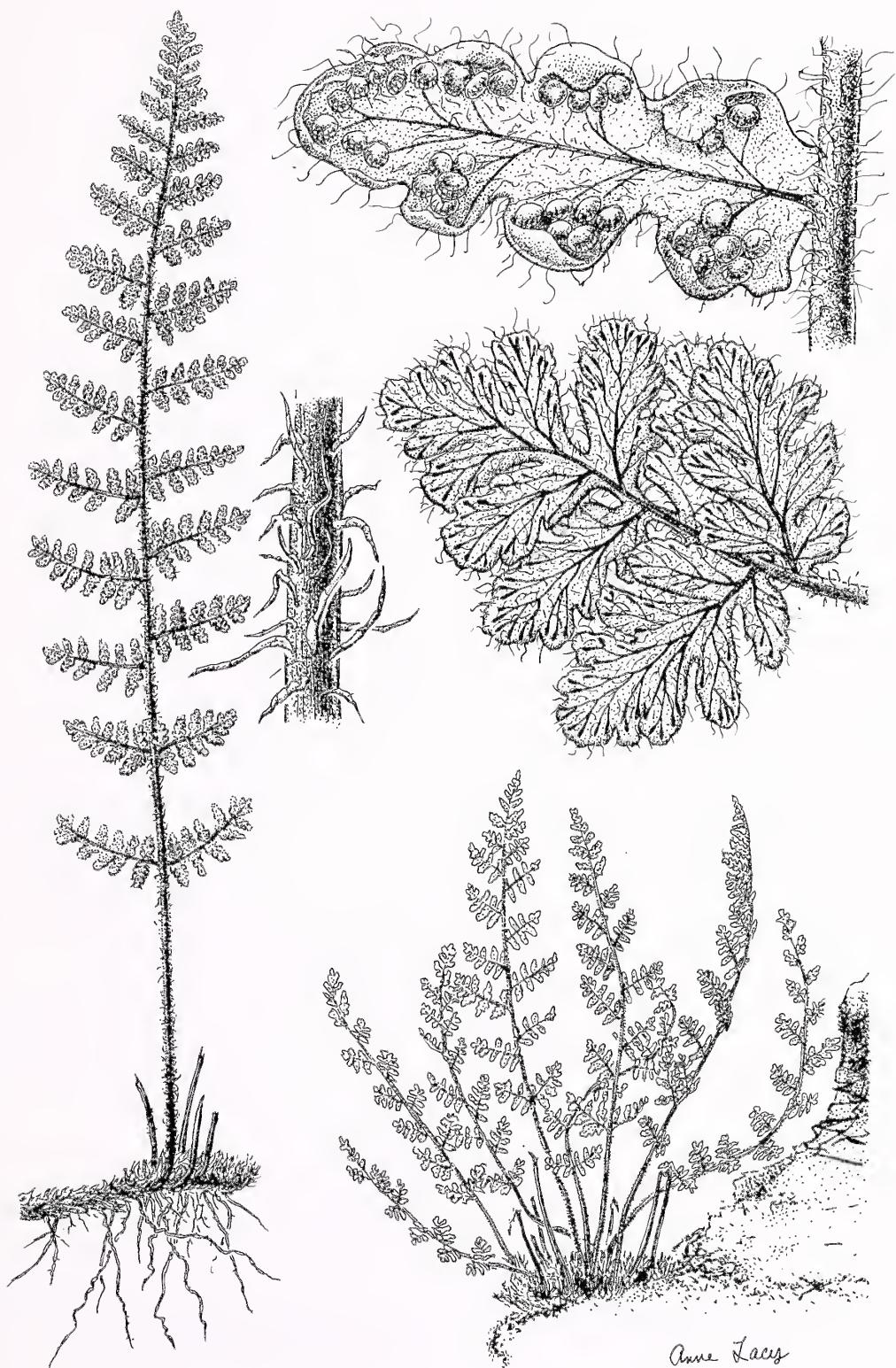
Counties: Dutchess, New York, Ulster, Westchester

This is our only representative species of this mostly western genus. The leaves may shrivel and curl during dry weather, but will revive with rain, much like Resurrection Plants (*Selaginella* species). Fronds are evergreen, mostly bipinnately compound with lobed pinnae, very hairy, especially on the leaf stalks. Spore clusters are enrolled in the margins of the pinnae. This distinctive species may turn up if it is sought, though it has not been seen in the State in the 20th century.



June Lacy

TERNATE GRAPE FERN *Botrychium ternatum*



Anne Lacy

WOOLLY LIP-FERN *Cheilanthes lanosa*

LOWLAND FRAGILE FERN

Cystopteris protrusa (Weath.) Blasd.

Status:	Threatened in New York State (T-3)
Rarity:	Rare in New York, reaching only the western and southernmost counties near the northern limits of its distribution range; ranging into Minnesota, but mostly southern, occurring south to Alabama and Louisiana.
Habitats:	Moist, often rich, organic soils in limestone-rich woods, swampforests and clearings.
D.E.C. Regions:	1, 2, 9
Counties:	Erie, Richmond, Suffolk

This species is very similar to the common Fragile Fern (*Cystopteris fragilis*), but the underground stem (rhizome) protrudes beyond the fronds of the season and is more elongate in general. The pinnae are also generally more elongate or lance-shaped, while those of Fragile Fern are blunter and bear fewer sori.

CLIMBING FERN, HARTFORD FERN

Lygodium palmatum (Bernh.) Sw.

Status:	Endangered in New York State (E-2)
Rarity:	Commercially exploited in the past. These plants are extremely rare in the northern part of their range of distribution in New England and New York State. Southward the distribution of the species is spotty from the coastal plain west to Kentucky.
Habitats:	In New York the habitats have been rich, open woods, borders and thickets; elsewhere the species is also known from swamps and marshes.
D.E.C. Regions:	3, 5, 7
Counties:	Chenango, Greene, Oneida, Onondaga, Saratoga

This unusual fern is a true vine. The fronds climb on other vegetation or ascend from ground level to a position where they nod in the wind and may contact other plants. The leaves are of two types. Lower leaves are broad and palmately 5-9 lobed, while the upper, fertile leaves are finely divided into tiny segments. These plants have been commercially gathered in the past for use in house decorations, flower arrangements and for cultivation.

SMOOTH CLIFF-BRAKE

Pellaea glabella Mett.

Status:	Threatened in New York State (T-3)
Rarity:	This species is distributed mostly south and west of New York State, being rare in New York and Vermont at the eastern edge of its distribution range. It is found in the State nine times in eight counties.
Habitats:	Open cliffs, ledges and talus in rich, often moist soils; often on limestone, but may also be found over sandstone or shale, the soil pH being near neutral.
D.E.C. Regions:	3, 4, 5, 6, 7, 9

Counties:	Albany, Columbia, Dutchess, Jefferson, Niagara, Onondaga, Warren, Washington
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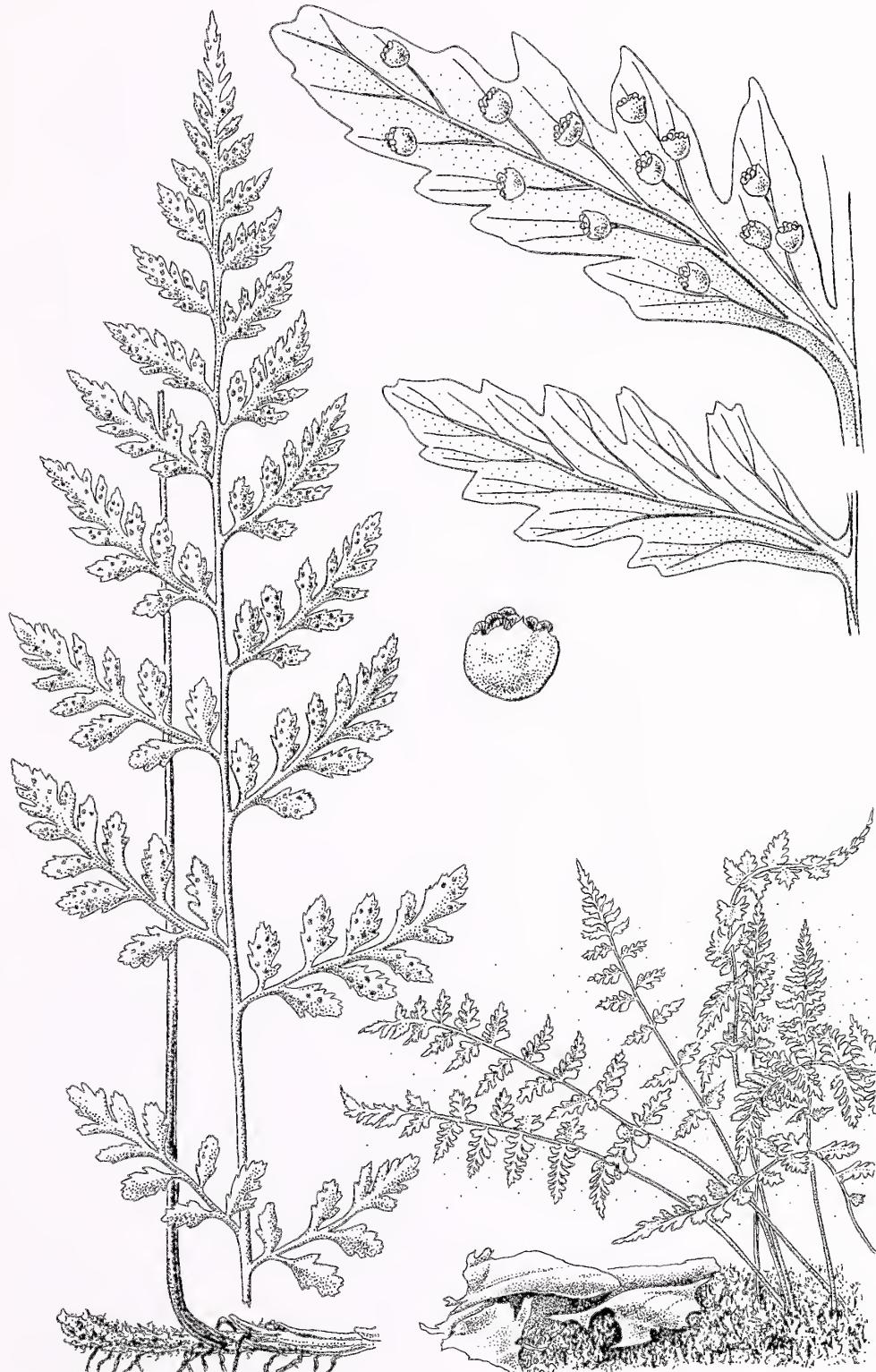
These plants have fertile and sterile leaves which look much alike. Unlike the Purple Cliff-brake (*P. atropurpurea*), the leaves are nearly hairless, bluish-green rather than gray-green, and the lower pinnae have practically no stalks.

HART'S-TONGUE

Phyllitis scolopendrium (L.) Newm.

Status:	Endangered in New York State (E-1)
Rarity:	Federally considered for listing. This species is known from Europe, but is very rare and sporadic in North America. It is known from a few localities in New York, Michigan, British Columbia, Tennessee, Alabama and Georgia. It is vulnerable to collection due to its spectacular appearance.
Habitats:	In New York it grows in rich, moist soil on limestone slopes, in depressions and on shaded cliff margins; elsewhere it is known from open, limey woods.
D.E.C. Region:	7
Counties:	Madison, Onondaga

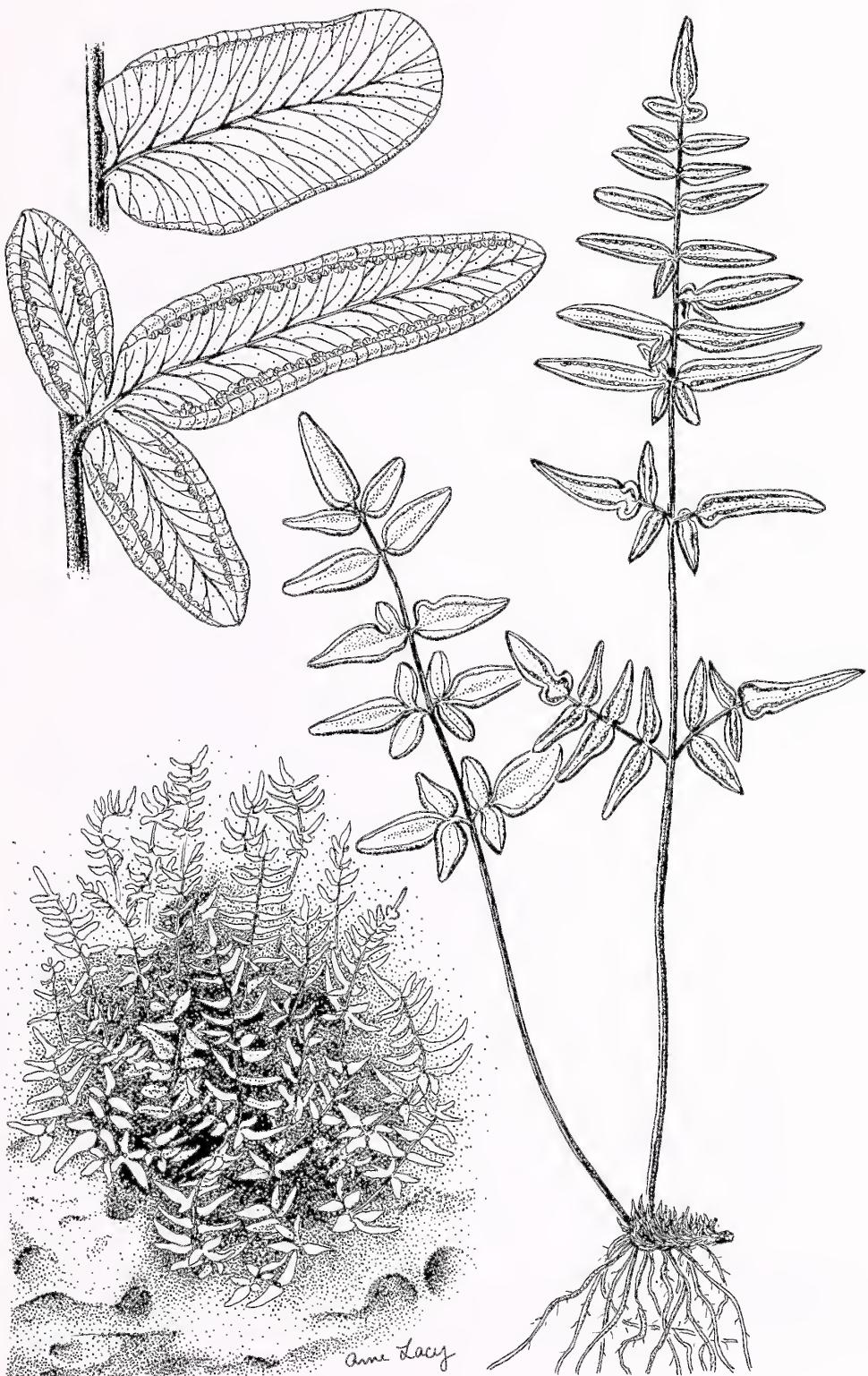
This striking plant has broad, strap-shaped blades and derives its name from the similarity of its leaf to the tongue of a deer. A leaf may be over a foot long and two inches wide. Spore clusters are borne in diagonal lines (sori) along the undersurfaces. The plants are in danger of commercial exploitation where not protected.



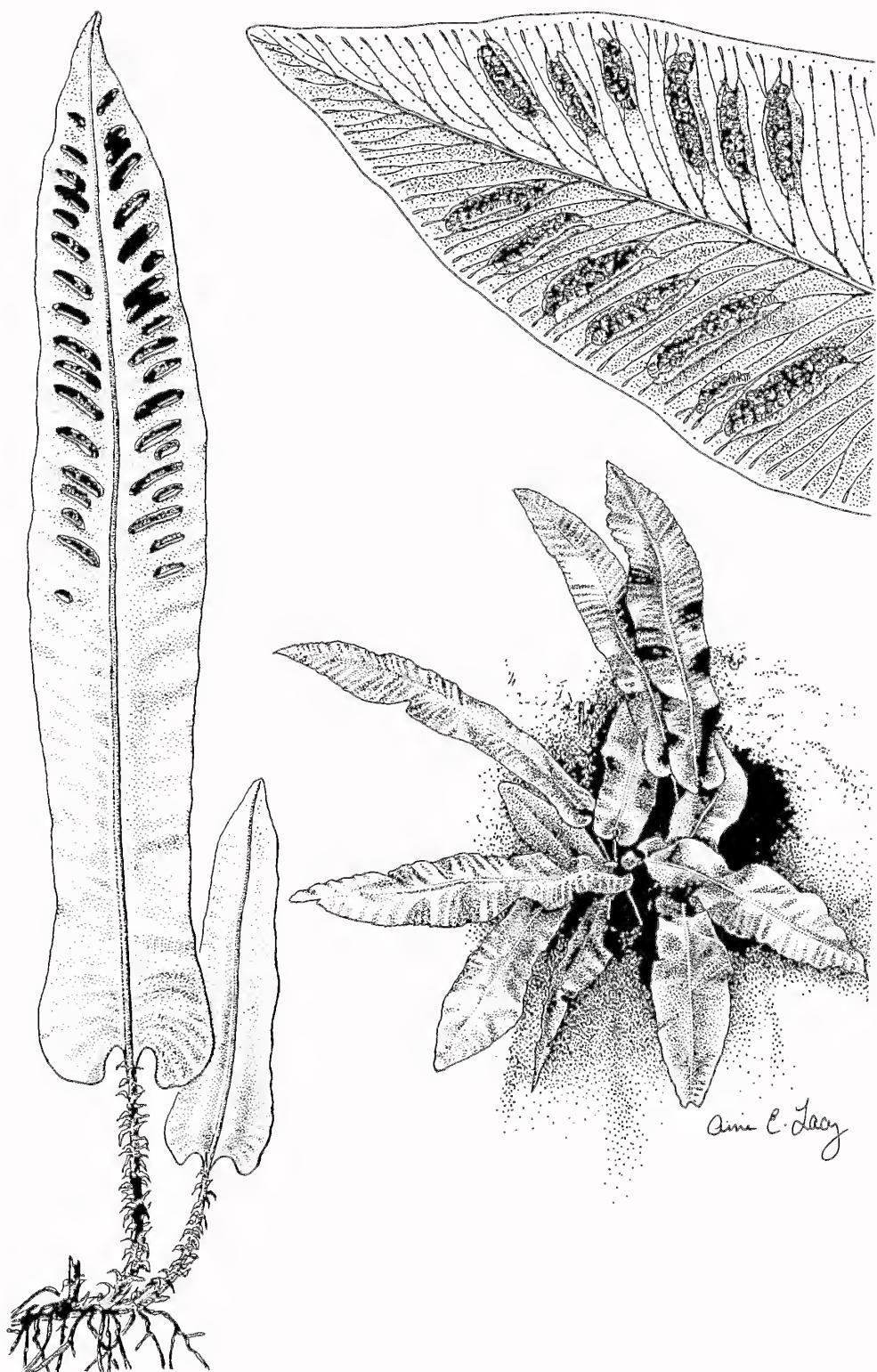
LOWLAND FRAGILE FERN *Cystopteris protrusa*



CLIMBING FERN *Lygodium palmatum*



SMOOTH CLIFF-BRAKE *Pellaea glabella*



HART'S-TONGUE *Phyllitis scolopendrium*

NORTHERN HOLLY FERN

Polystichum lonchitis (L.) Roth

Status:	Endangered in New York State (E-3)
Rarity:	This species, though extremely rare in the eastern United States, is a relatively common, widespread Holly Fern of the northwestern states, western Canada and Alaska. It is also a native of Eurasia.
Habitat:	Limestone cliffs and talus, in its eastern range, to shady fir forest and thicket situations in the west.
D.E.C. Region:	9

County: Cattaraugus

This species most resembles the common Shield or Christmas Fern (*P. acrostichoides*) of the east, but the fertile pinnae are not noticeably reduced in size. The sterile pinnae are also gradually reduced in size toward the base of the frond.

CURLYGRASS

Schizaea pusilla Pursh

Status:	Endangered in New York State (E-1) Federally considered for listing.
Rarity:	New York State has a single known population of these tiny plants, while the only other known United States locations are in the New Jersey Pine Barrens. This species is also rare in the Canadian Maritimes.
Habitats:	Sandy bogs and dune depressions, wet, sedgy areas and hummock borders in fens.
D.E.C. Region:	1

County: Suffolk

As some of the smallest members of the flora, these plants can be easily overlooked; however, the habitats where they might grow have been searched in New York with no success. These tiny ferns are less than two inches tall when mature, and consist of slender, thread-like leaves and a tiny naked stalk bearing a few sporangia at the tip. Even when their location is known, they are difficult to find among the matted sedges and grass.

ALPINE WOODSIA, NORTHERN WOODSIA

Woodsia alpina (Bolt.) S.F. Gray

Status:	Threatened in New York State (T-3)
Rarity:	This species is arctic-alpine and ranges southward to New York, Vermont and Maine where it is rare on peaks at its southern limits. It is also found in northern Eurasia.
Habitats:	Open rocky places, ledges, and talus to fell-fields and tundra further north. Soil may be limestone-rich to neutral or slightly acid.

D.E.C. Regions: 3, 5

Counties: Essex, Ulster

Woodsias are not easily distinguished from one another, especially in early stages of growth. Alpine Woodsia grows in very cold habitats and has very few scales on the leaf stalks, as opposed to the more common Rusty Woodsia (*W. ilvensis*). The stalks are brownish toward the bases and have a few scales, unlike Smooth Woodsia (*W. glabella*), which has green, scaleless ones. The pinnae (leaflets) are oval to oblong, lobed and cut.

SMOOTH WOODSIA

Woodsia glabella R.Br.

Status:	Threatened in New York State (T-3)
Rarity:	These plants are very rare in Maine, New Hampshire, Vermont and New York, where they reach their southern limits of distribution in the Catskill Mountains. They range to the Arctic.
Habitats:	Cliffs and ledges to tundra and talus, often in lime-rich areas, but soils are often near neutral.
D.E.C. Regions:	3, 5, 6

Counties: Essex, Green, Herkimer

This species is found in similar habitats to those of Alpine Woodsia, but may be distinguished by its totally green, hairless and scaleless stalks. The pinnae (leaflets) are nearly circular to triangular, lobed and cut, without hairs.

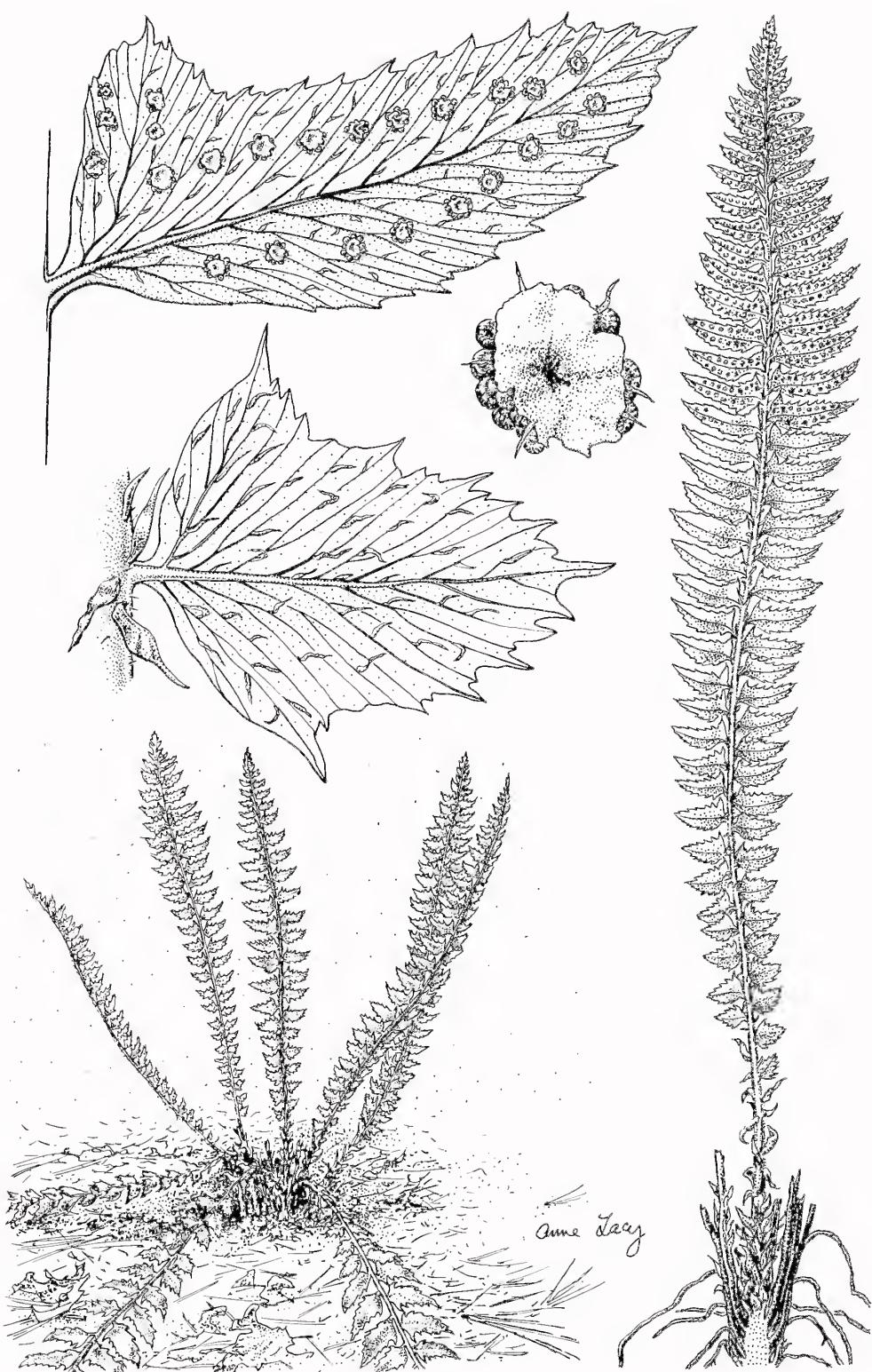
CATHCART'S WOODSIA, "OREGON WOODSIA"

Woodsia oregana D. C. Eat. var. *cathcartiana* (Rob.) Mort.

Status:	Endangered in New York State (E-1) Federally considered for listing.
Rarity:	An extremely rare variety of a widespread western species. It is found in a single New York location (a single plant), and is almost as rare in Michigan, Wisconsin, Minnesota and Canada. It is a strong variety, considered by some authors to be a full species.
D.E.C. Region:	8

County: Ontario

Of our native ferns, Cathcart's Woodsia most resembles Blunt-lobed Woodsia (*W. obtusa*), from which it differs in having stalks without hairs and with scales only at the bases, pinnae (leaflets) with fewer pairs of lobes (2-5), and spore clusters with hair-like rays. The pinnae are elongate with more lobes than either Smooth or Alpine Woodsia. This plant is extremely endangered and may soon be eliminated from the New York State flora.



NORTHERN HOLLY FERN *Polystichum lonchitis*



CURLYGRASS *Schizaea pusilla*



ALPINE WOODSIA *Woodsia alpina*



SMOOTH WOODSIA *Woodsia glabella*



Anne Lacy

CATHCART'S WOODSIA *Woodsia oregana* var. *cathcartiana*

Rare Orchids of New York State

Orchids are highly susceptible to extirpation through a variety of natural and man-made processes. They are often among a region's rarest species, and this is unquestionably true in New York State. Orchids live in precarious associations with root fungi, which supply them with water and nutrients, but also present them with a constant threat of uncontrolled infection and death. It is consequently not surprising that many orchids exhibit precise habitat requirements and are often limited to unusual environments. Most species are very susceptible to slight alterations in their environment. Moisture changes, successional changes, and other subtle alterations may be as lethal as outright destruction of an area through excavation, cultivation, or other development. Furthermore, many species are short-lived, and colonies depend on abundant seed production and seedling-establishment for survival.

Orchids are popular plants. They possess mystic and exotic qualities and generate considerable excitement when they are found in the wild. As a result, they are avidly sought by orchidists and certain gardeners. Unfortunately, the critical habitat requirements of most species make them, at best, very difficult horticultural subjects, and few species can be successfully cultivated. None of our native species can be reliably grown from seed, and with only a few have even sporadic successes been reported. As a result, horticultural demand is supplied from the wild, and populations decline as a result. Some species are presently more threatened by collection than by any other single factor.

ROUND-LEAVED ORCHIS

Amerorchis rotundifolia (Banks) Hultén

Status: Possibly extirpated in New York State (X-2)

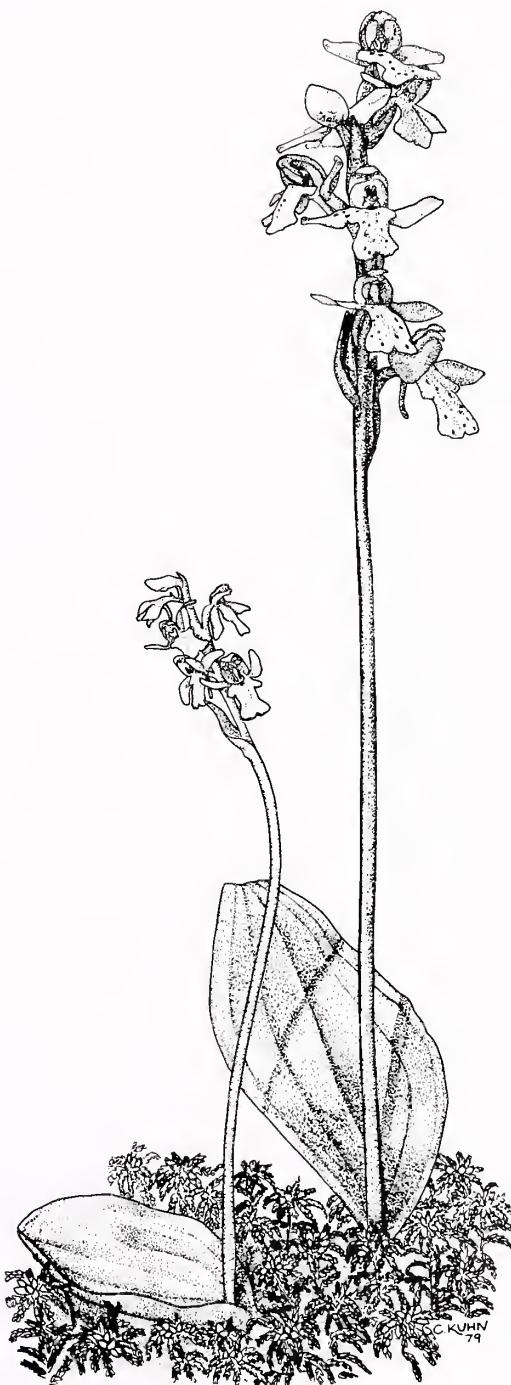
Rarity: Transcontinental at high latitudes; extremely rare as far south as the northeastern United States. This species has been found in the State at only two sites, and has not been seen in over one hundred years. Both of the stations for the plant were swampforests now extensively altered by development, so the plants probably no longer occur there. However, much seemingly suitable habitat occurs in other swamps, especially in Herkimer County, and the species may yet be relocated in the State.

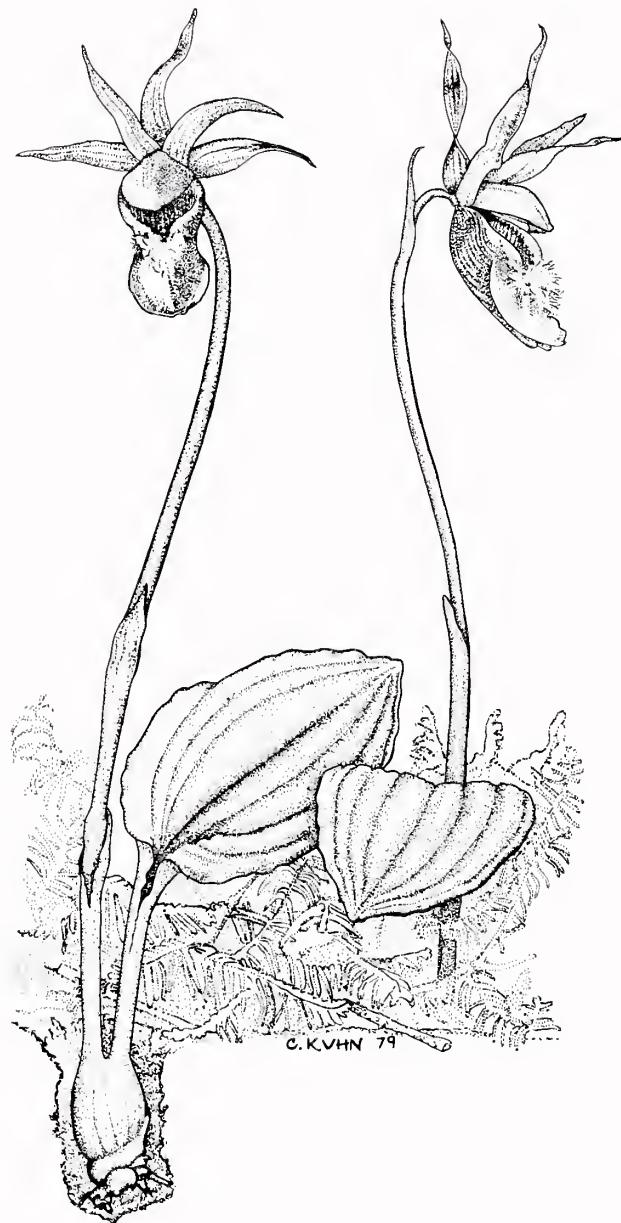
Habitats: Cold, calcareous swamps (in N.Y.).

D.E.C. Region: 6

Counties: Herkimer, Lewis

The Round-leaved Orchis is a small, single-leaved plant with a few pink and white flowers on a leafless stem. The flowers have flat, pink-spotted, white lips with deep lateral lobes. Other species with lobed, pink and white lips have leafy stems; the Showy Orchis (*Galearis spectabilis*) bears similarly-colored flowers on a leafless stem, but its lips are unlobed, and it has paired leaves.





CALYPSO

Calypso bulbosa (L.) Oakes

Status: Endangered in New York State (E-3)
 Rarity: Generally distributed at high latitudes and in cool regions in North America and Eurasia. Calypso is abundant in some portions of its vast range, but is generally very rare in eastern North America. In New York, it has been found only three times in this century (only once in the last 50 years); one of these stations has been destroyed, and the plant has not been seen elsewhere since 1949. Apparently the species was only tenuously established in New York, and was quickly eliminated with changes brought on by development, though it may still be rediscovered here.

Habitats:

Swamps, bogs and moist coniferous woods in calcareous soils, especially with Arbor Vitae (*Thuja occidentalis*).

D.E.C. Regions: 4, 6, 7, 8.

Counties: Genesee, Herkimer, Jefferson, Lewis, Oneida, Onondaga, Oswego, St. Lawrence, Schenectady.

Calypso is unlike our other orchids; though it bears a pink and yellow pouch-like lip (resembling the Lady-slippers), there is only a single, smooth leaf at the base of the plant. The leaf is produced in late summer and over-winters; it withers in the spring and is sometimes absent by flowering time.

STRIPED CORALROOT

Corallorrhiza striata Lindl.

Status: Endangered in New York State (E-2)
Rarety: Widespread in western North American Mountains; disjunct and rare in upper Great Lakes region and St. Lawrence drainage. A single New York location was verified in 1979. The Striped Coralroot has been recorded at only three stations in New York, and at only one in the last 50 years; the known extant population is a single plant.

Habitat: Moist, mixed coniferous-hardwood forests over limestone, and calcareous swamps.

D.E.C. Regions: 6, 7, 8

Counties: Lewis, Madison, Monroe.

The Coralroots are nongreen, leafless, saprophytic orchids. Striped Coralroot is the largest of the species in our area, often over 1½ feet tall, with flowers nearly an inch across. In contrast, other species bear flowers less than ½ inch across, and often much smaller. In Striped Coralroot the entire plant is bright reddish, and the flowers strikingly striped with white or cream. The New York records of this species come from deep, calcareous swamps, though elsewhere, as in the Great Lakes region, the species occurs primarily in upland woods (sometimes rather scrubby) in thin soil over limestone. It could occur in similar sites in this State.

RAM'S-HEAD LADYSLIPPER

Cypripedium arietinum R.Br.

Status: Threatened in New York State (T-1)
Rarety: A species with rather limited habitat requirements, occurring primarily in the Great Lakes and St. Lawrence regions, this is a generally rare plant throughout its range. The rarity of the Ram's-head and its curious flowers make it a prized garden plant, and the species is commercially exploited in some other northeastern states. It is occasionally dug by individuals, but is rather inconspicuous, and at present its collection does not seem to have been a major problem in New York.

Habitat: Two distinct habitats are occupied in New York, having in common a limestone-rich substrate. The principal habitat, in terms of size of colonies, is open coniferous or mixed forest and scrub over limestone. The

species is apparently more generally distributed in calcareous swamp-forests on hummocks, but in such sites the colonies are very small.

D.E.C. Regions: 4, 5, 6, 7, 8.

Counties: Albany, Clinton, Essex, Fulton, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Otsego, Schenectady, Warren, Wayne.

The Ram's-head Ladyslipper is smaller than its relatives, with its pouch forming a downward-projecting cone; it is definitely not slipper-shaped. The white and reddish flowers are further unusual in bearing three separate sepals, whereas in other *Cypripediums* the lower two sepals are fused behind the pouch. Hence, the Ram's-head bears five slender segments (sepals and petals), while other species have only four.

SMALL WHITE LADYSLIPPER

Cypripedium candidum Muhl. ex Willd.

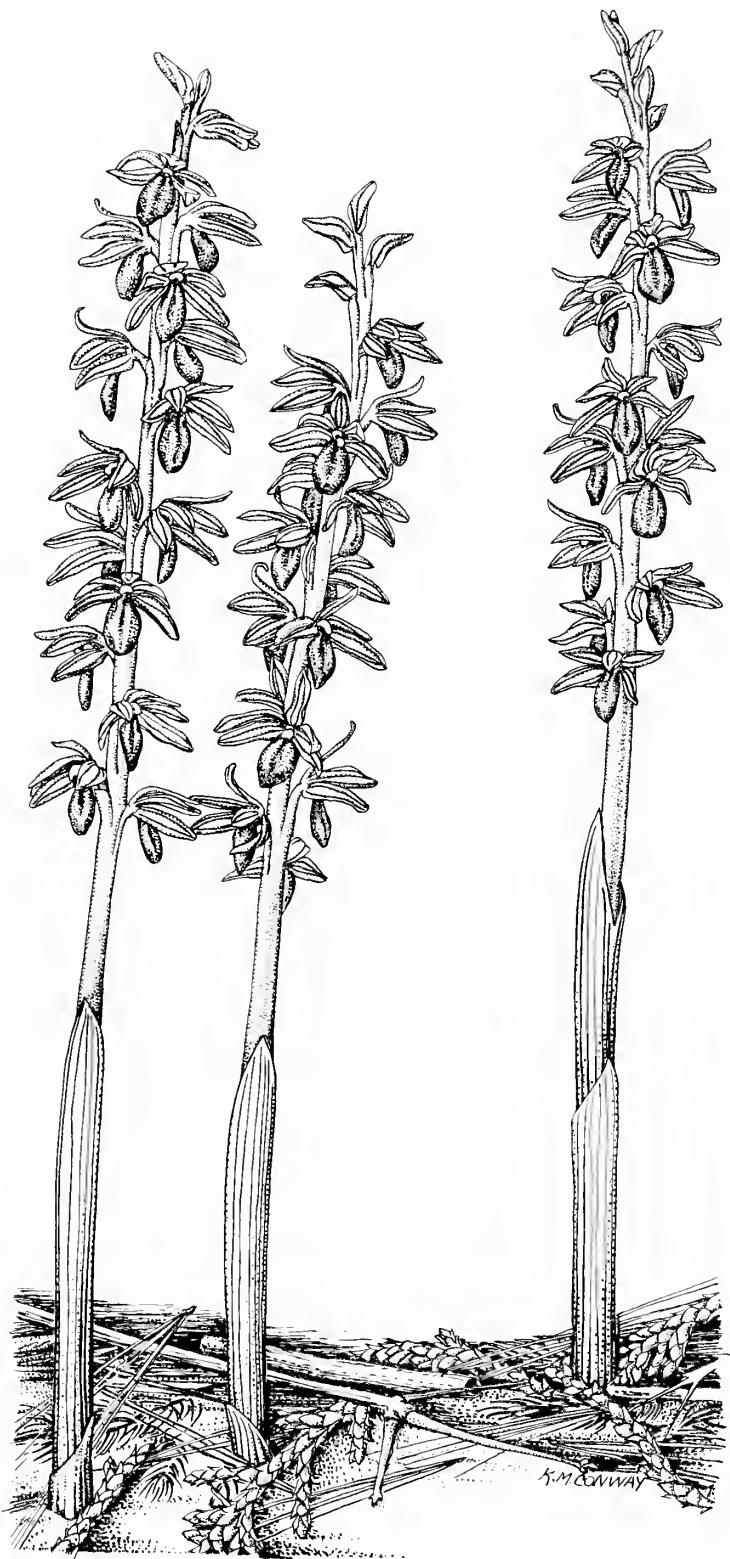
Status: Endangered in New York State (E-1)
Rarety: A rare, midwestern species scattered locally eastward to the Northeast. In New York, confined to the western and central portions of the State. Only two populations of this species are known to survive in New York. Two others have been destroyed. Both extant populations are threatened with successional change and require active management, including burning, brush-cutting, and/or mowing, to preserve them. The rarity and beauty of the species has made it a prized garden subject, and it is often dug by unscrupulous horticulturists. The plant is very difficult to cultivate, however, and so far impossible to grow from seed. It should never be moved from a wild colony except to prevent its imminent destruction.

Habitats: Calcareous meadows and fens.

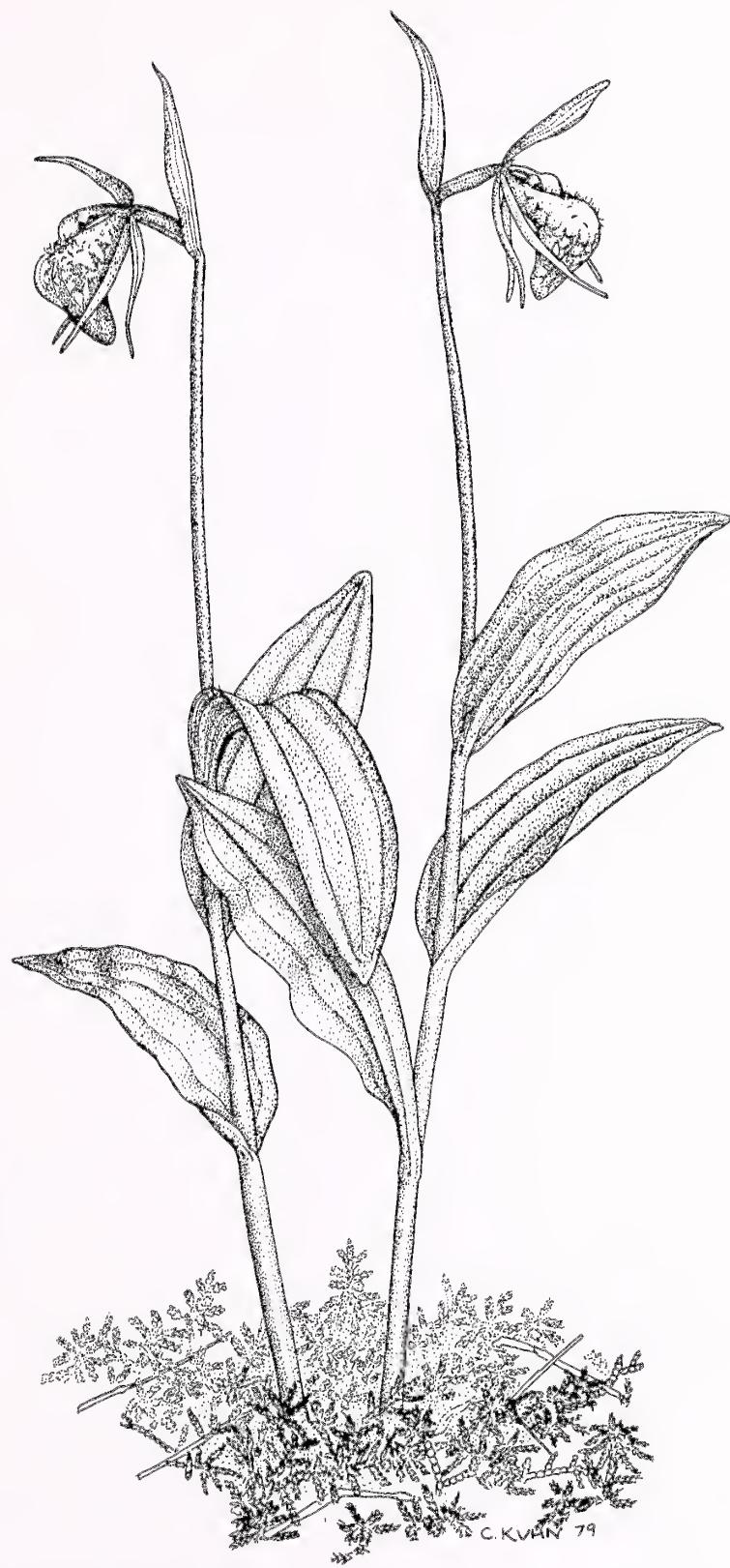
D.E.C. Regions: 7, 8, 9.

Counties: Erie, Genesee, Livingston, Onondaga.

Cypripedium candidum is similar to the more common Yellow Ladyslipper (*C. calceolus*), especially to small-flowered forms of that species. The two species may readily be distinguished by the white lip (slipper) of *C. candidum*, and the yellow lip of *C. calceolus*. In nonblooming plants, *C. candidum* can often be identified by its relatively long leaves, which are commonly



STRIPED CORALROOT *Corallorhiza striata*



RAM'S-HEAD LADYSLIPPER *Cypripedium arietinum*



SMALL WHITE LADYSLIPPER *Cypripedium candidum*

broader toward the tips, borne toward the base of the plant, and directed upward in an ascending cluster; in contrast, the broad leaves of *C. calceolus* generally spread widely and are born at regular intervals along the stem. The Small White Ladyslipper might also be confused with white-flowered plants of the Pink La-

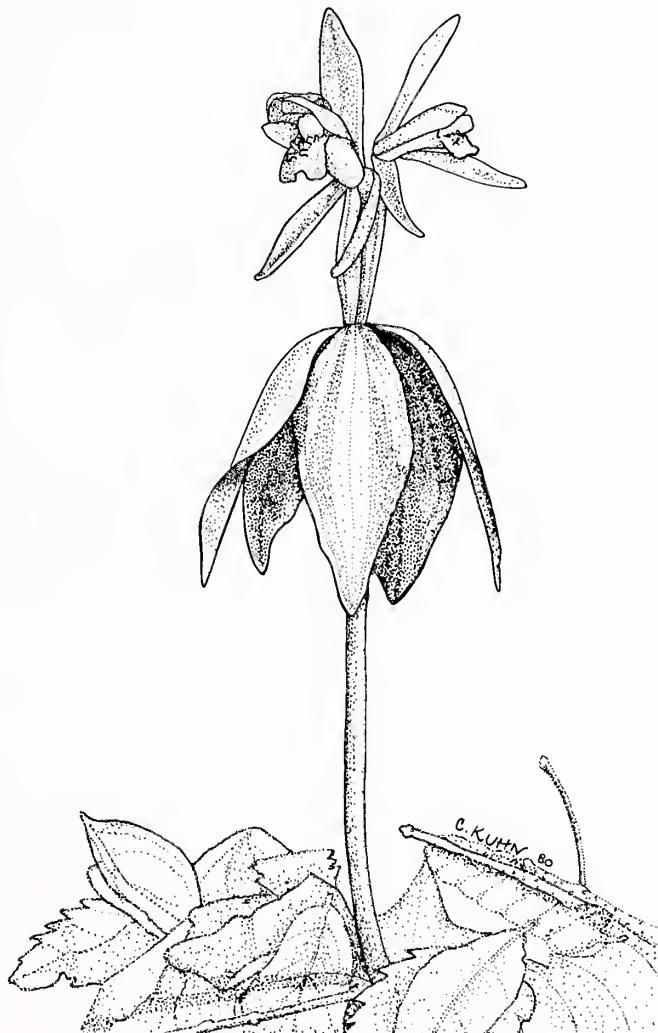
dyslipper (*C. acaule*) and with the Showy Ladyslipper (*C. reginae*); the former bears only two basal leaves and does not have the leafy stem of *C. candidum*, and the latter bears broad, flat, white sepals and petals, not the slender greenish or brownish ones of *C. candidum*.

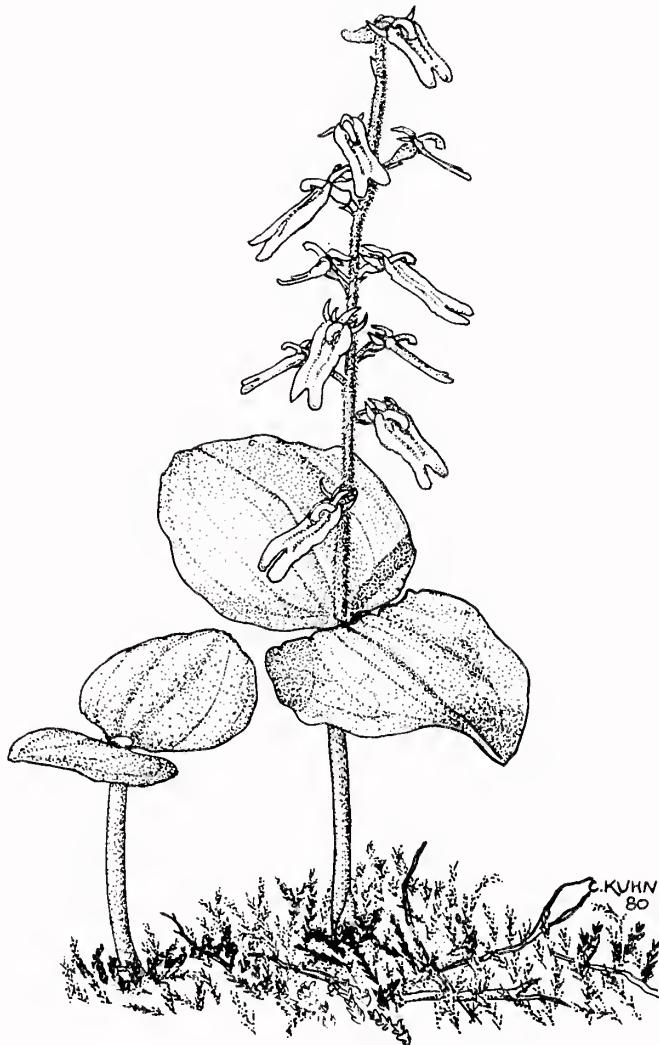
SMALL WHORLED POGONIA

Isotria medeoloides (Pursh) Raf.

Status:	Endangered in New York State (E-1) Federally proposed endangered.
Rarity:	An exceedingly rare species, sporadically distributed through the easternmost states; also three stations in the Midwest. Only a single New York station has been seen in the last 50 years; in recent years, only a single plant has appeared at this site, on the average appearing every three years.
Habitat:	Deciduous or mixed coniferous-deciduous woodland in dry to swampy situations. Often associated with limestone, but sometimes in acidic soils.
D.E.C. Regions:	1, 3, 5, 7
Counties:	Nassau, Onondaga, Rockland, Suffolk, Ulster, Washington (all old records except Onondaga County)

The Small Whorled Pogonia, when not in flower, resembles its relative, the Larger Whorled Pogonia (*I. verticillata*). From this species it is distinguished by its smaller, mostly yellow-green flowers; the larger species has long slender sepals which are darkly stained with purplish-brown. Sterile plants of either of these species closely resemble Indian Cucumber (*Medeola*), but the stems of the orchids are thick and fleshy, whereas in Indian Cucumber the stems are thin, wiry and often blackish. Sometimes seedling lilies with a single whorl of leaves may also be confused with these orchids. These may be very similar, but become obvious if adult plants can be found in the vicinity. This species does not exhibit any pronounced habitat requirements other than a need for forest cover. Soils range widely in pH, but even in acidic situations calcareous material is usually nearby. These plants are noted for long periods of dormancy, and appear above ground only irregularly. Colonies often fluctuate in apparent size from year to year, and the species may not be evident for years at a time. It is consequently very difficult to locate.





AURICLED TWAYBLADE

Listera auriculata Wiegand

Status: Endangered in New York State (E-1)
Federally considered for listing.

Rarity: A rare species of the upper Great Lakes region and eastern Canada, disjunct in northern New York. The Auricled Twayblade is a tiny, inconspicuous plant which is known in New York from two locations, one recently discovered and another from a single collection made over 50 years ago. Many miles of apparently suitable habitat line the streams and rivers of the northern part of the State, however, and it may soon be found again in New York.

Habitat: Thickets at the edges of streams and rivers in alluvial sands and mucky

sites, usually on moss under Alders (*Alnus*).

D.E.C. Regions: 5, 6

Counties: Lewis, Warren

This species is one of the true Twayblades, which are characterized by a single pair of leaves born perpendicularly to the stem about half-way up the plant. Only two species of this genus in New York bear flowers with broad, flat lips. The others are slender with forked tips like a snake's tongue. The lip of the Auricled Twayblade has roughly parallel sides, and is generally about as broad at the base as at the tip. At the base, the sides are prolonged into short ear-like lobes which project upward into the center of the flower. Our other broad-lipped species (*L. convallarioides*) bears a wedge-shaped lip which is very much broader at the tip than at the base, and lacks the basal lobes.

CRESTED FRINGED ORCHID

Platanthera cristata (Michx.) Lindl.

Status: Endangered in New York State (E-2)

Rarity: A Coastal Plain species more common southward, reaching its northern limit on Long Island. This species occurs in a few open pine-barrens and has been found rarely on wild roadsides. The largest population is threatened with development. All are perhaps threatened by gardeners and other horticulturalists, who would prize this species along with the other fringed orchids.

Habitat: Moist to wet, often boggy, peaty and sandy sites in most of its range. In New York usually moist to rather dry sand under pine litter.

D.E.C. Regions: 1

Counties: Suffolk

The flowers of this species are generally bright orange through most of its range, but in New York can be pale yellow to creamy. Depending on color, it could be confused with either the White Fringed Orchid (*P. blephariglottis*) or Orange Fringed Orchid (*P. ciliaris*). It is distinct from both in bearing much smaller flowers. The spur is much shorter (less than $\frac{1}{4}$ inch long) than the lip; in the other species the spur is generally about equal in length to the lip.



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PRAIRIE WHITE-FRINGED ORCHID

Platanthera leucophaea (Nutt.) Lindl.

Status: Endangered in New York State (E-1)
Federally considered for listing.

Rarity: This is a very rare species of the prairies and the Great Lakes region where it has been nearly exterminated by development. Always exceedingly rare as far east as New York, it has been reported from only four stations in the State, most recently in 1905. All but one of its stations appear to have been significantly altered in recent years, and the species may no longer occur in New York. One site remains in good condition, however. This species remains dormant for protracted periods, and no plants may be in evidence for several years at a time. Occasionally, however, they may appear in abundance for one or two years, only to seemingly disappear subsequently. This behavior obviously makes locating the species difficult; it may still persist in New York, but will require concerted effort for discovery.

Habitat: Primarily a plant of open, calcareous prairies; in the northeast it occupies open, calcareous bogs, fens, and marshes.

D.E.C. Regions: 7, 8, 9

Counties: Niagara, Onondaga, Oswego, Wayne
The Prairie White-fringed Orchid differs from the more common White-fringed Orchid (*P. blephariglottis*) in bearing a broad lip with three primary lobes, each of which is further divided and fringed. In contrast, *P. blephariglottis* bears a narrower, tongue-shaped lip with a continuous fringe. White-flowered plants of the Purple Fringed Orchids, which bear lips of the same shape as *P. leucophaea*, could be confused with it. The flowers of *P. leucophaea* (about $\frac{3}{4}$ to 1 inch wide) are much larger than those of the Smaller Purple Fringed Orchid (*P. psycodes*) and about the same size as those of the Larger Purple Fringed Orchid (*P. grandiflora*). From this last species, *P. leucophaea* is most noticeably distinct in its much longer spur (2-3 times the length of the lip in *P. leucophaea*, versus only slightly longer in *P. grandiflora*).



An Assemblage of Significant New York State Rarities

In addition to the rarest ferns and orchids, most of the following species were studied intensively during a period when the botany staff of the New York State Museum was working cooperatively under contract with the U.S. Fish and Wildlife Service. The goal was to obtain current field-status reports containing ecological and demographic data on plants feared to be endangered or threatened in the State. Emphasis was, of

course, on species being considered for federal listing, but certain species not listed in the Federal Register were included, as recommended by New York botanists. In some cases field searches revealed enough populations and individuals to discourage federal listing, but with some species threats proved to be critical. For a list of rare and endangered species proposed for protection in New York State, see page 70.

NORTHERN MONK'S-HOOD (Crowfoot Family, Ranunculaceae)

Aconitum noveboracense A. Gray

Status: Federally listed Threatened; Threatened in New York State (T-1)

Rarity: This species is known from four states: Ohio, New York, Iowa and Wisconsin. It was originally described from New York State from a site where it no longer occurs. One population was recently partially destroyed by campers, and the largest colony (of some 400 individuals) is vulnerable due to its proximity to a road.

Habitats: Cold streambeds, mossy banks and talus, gravelly areas, springheads, seeps, rich woods and partial clearings.

D.E.C. Regions: 3, 7

Counties: Ulster, Chenango

This species is showy and vulnerable because of its horticultural desirability. Plants are often tall and branched, with variable, palmately divided leaves of a type common among Buttercups. Flowers are purple, up to an inch high and helmet-shaped with cap-like hoods (Cover and page viii). They are not likely to be confused with other wildflowers in New York, since their nearest relatives are found to the south and west. In our area they most closely resemble cultivated European Monk's-hoods and garden Delphiniums. When not flowering, Monk's-hoods may be told from most Buttercups by the lack of pale, yellow blotches near the cuts of their leaf margins. The leaf stalks of Buttercups also collapse when squeezed, while those of Monk's-hood do not.



C.Kuhn Teale 81



MOSCHATEL (Moschatele Family, Adoxaceae)

Adoxa moschatellina L.

Status: Threatened in New York State (T-3)
 Rarity: This is primarily a Eurasian plant, but it has a spotty distribution from Alaska to the southern Rockies, Iowa, Minnesota and Wisconsin. Its occurrence in the New York Catskills is nearly a thousand miles from the rest of its range, and represents a striking case of disjunction.

Habitats:

Woodlands in rich humus, often on ledges, frequently associated with lime-rich rocks.

D.E.C. Region: 4

Counties: Delaware, Greene

These small plants have leaves divided and lobed in threes and are easily mistaken for Wood Anemone (*Anemone quinquefolia*) or seedlings of other plants when not flowering. Flowers are small and greenish-yellow with 4 or 5 petals. They are borne in a dense cluster at the tip of a slender, purplish stalk.

GERARDIA ("False Foxglove") (Figwort Family,
Scrophulariaceae)

Agalinis acuta Pennell

Status: Endangered in New York State or possibly extirpated (X-1); Federally considered for listing.

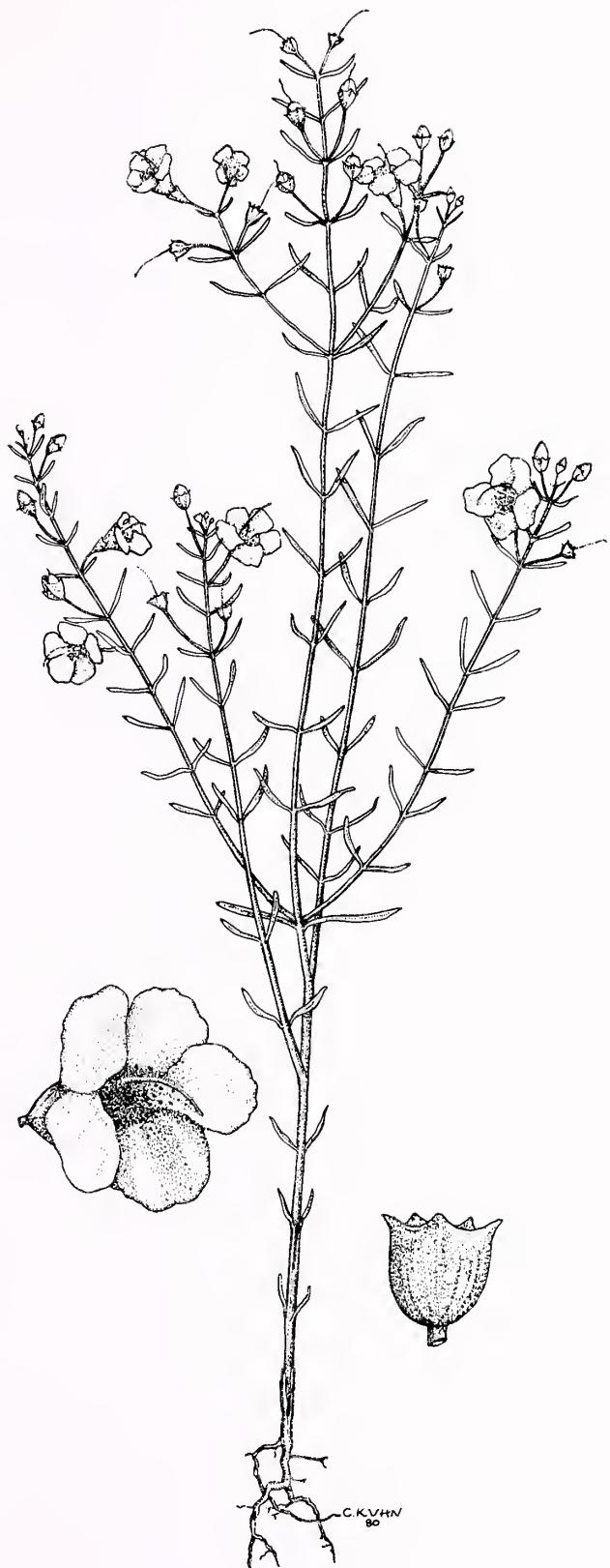
Rarity: This is a rare species of open meadow and grassy downs on Cape Cod and Long Island. It has been found in the past at a number of stations on Long Island, but most of these have been overgrown or cleared. The species seems to have been concentrated at the eastern and western ends of the island; in the west it occurred on the Hempstead Plains, and its stations have been completely destroyed by development; in the east, successional change of the open Montauk Downs to scrub and woodland seems to have eliminated the species. Although it possibly persists in low numbers, it has not been found in the State in the last fifty years.

Habitat: Dry, open meadows and downs

D.E.C. Region: 1

Counties: Nassau, Suffolk

Agalinis acuta is one of a group of showy-flowered, slender-leaved plants commonly called Gerardias. Distinctions between species are in small details of the calyx and in the length of the stalks of the individual flowers. In *A. acuta* and some of its relatives, the calyx is composed of five small, slenderly triangular (rather than roundish) greenish lobes at the base of the flower. The pedicels of the flowers in this species are distinctly longer than the calyces (rather than shorter). From the few other species with this combination of characteristics, *A. acuta* is distinct in displaying a finely reticulate pattern of veins on the calyx; the other species show no obvious venation. Plants are pale green in color.



CUT-LEAVED ANEMONE (Crowfoot Family,
Ranunculaceae)

Anemone multifida Poir.

Status: Probably extirpated in New York State (X-3)

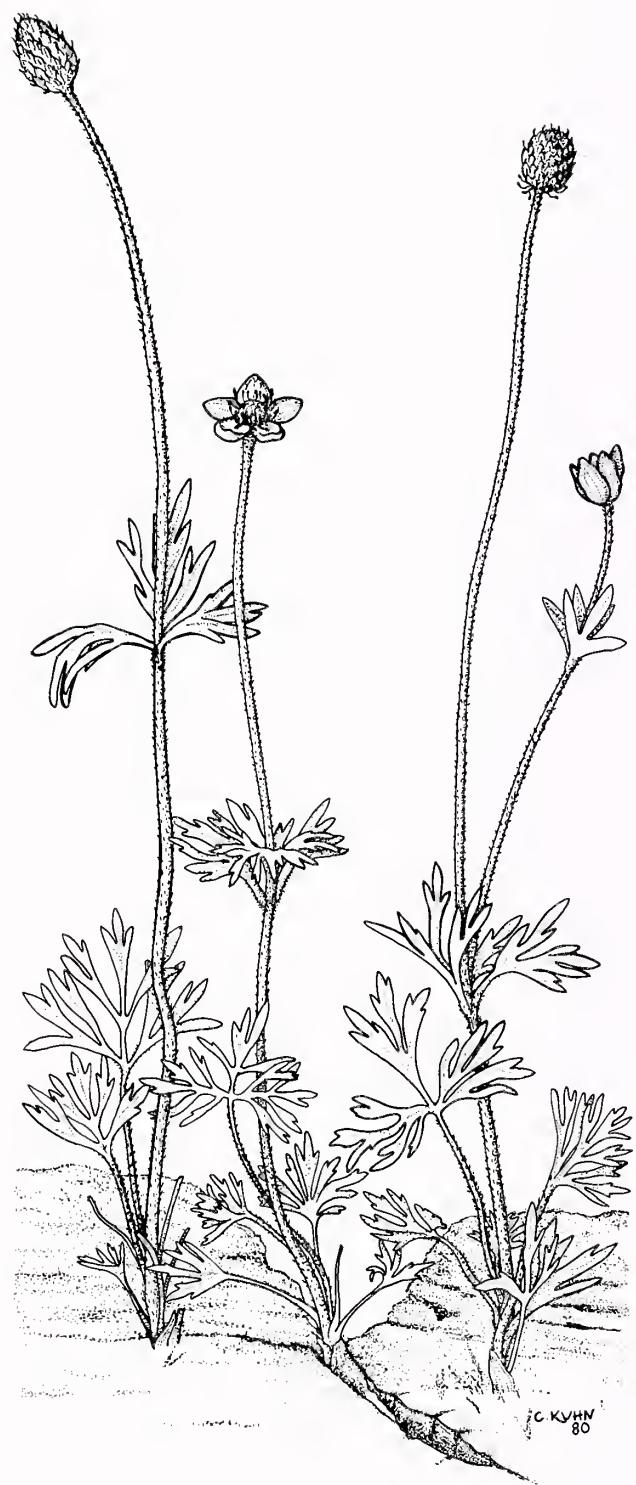
Rarity: This is a wide-ranging species with many varieties. In eastern North America it reaches its southern limits in Maine and Vermont (formerly New York). It also ranges to Alaska and South America.

Habitats: A wide range of open, rocky places; found on steep, limestone riverbluffs in New York and Vermont.

D.E.C. Region: 6

County: Jefferson

Cut-leaved Anemone differs from other native species in having leaves cut into many lance-shaped lobes. There are usually only one or two flowers borne on slender stalks. Fruit are borne in a woolly, oval head. These plants have been sought intensively in the area where they once grew and are now feared extirpated. The riverbanks where they once were found with Prairie Smoke (*Geum triflorum*) have been much-disturbed by industrialization, and both species probably succumbed to water level rises after extensive dam building in the 19th century. Neither has been reported since the 1860's.



PORTER'S REEDGRASS (Grass Family, Poaceae)

Calamagrostis porteri A. Gray

Status: Threatened in New York State (T-3)

Rarity: Once thought to be rarer than it is, this Reedgrass remains an uncommon, Appalachian species, reaching its northern limits in New York State. Its very rare subspecies *perplexa* is only found in New York, and only in a single verified location.

Habitats: Dry, upland woods and slopes

D.E.C. Regions: 7, 8

Counties: Chemung, Steuben, Tioga,
Tompkins

This grass is listed here as an example of a relatively uncommon species which was rejected for federal listing (as threatened) after being sought out and studied in the field. The typical variety is known from Kentucky, New York, Pennsylvania, Virginia and West Virginia, while subspecies *perplexa* is known from a single locality in Tompkins County, New York. Subspecies *perplexa* is listed as a full species by some authors and differs from var. *porteri* in its chromosome number and in having smaller florets and flower parts.





LONG'S BITTERCRESS (Mustard Family, Brassicaceae)

Cardamine longii Fern.

Status: Threatened in New York State (T-1)

Federally considered for listing.

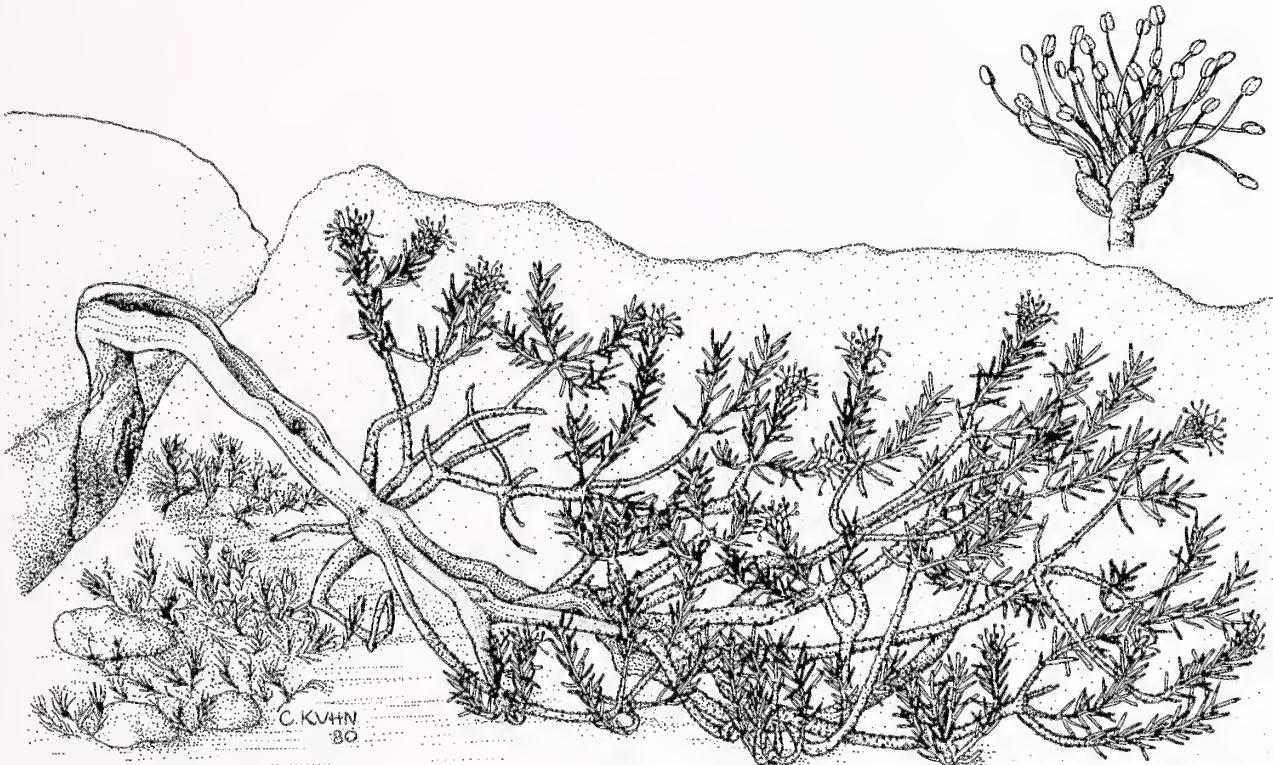
Rarity: This rare and sporadically distributed plant is found in coastal areas of Maine, New York, Maryland and Virginia. It is small and easily overlooked, and should be sought all along the eastern seaboard.

Habitats: Muddy banks and shores of estuaries

D.E.C. Region: 1

County: Suffolk

The foliage of these inconspicuous plants may be lobed and toothed, much like other small members of the Mustard Family, but most leaves are unlobed or only 2–3 lobed. An added discouragement to their detection is the lack of any showy flower parts. The petals are so minute and drop so early that the botanist who originally described the species claimed that it lacks petals.



BROWN CROWBERRY, BROOM CROWBERRY (Crowberry Family, Empetraceae)

Corema conradii Torr.

Status: Endangered in New York State (E-3)

Rarity: A northern, coastal species becoming rare and sporadic southward to New Jersey.

Habitats: This species occurs primarily along the coast in exposed, sandy soils. In New York, however, the only known population is on an exposed lip of a cliff. The plants here are very low-growing and mat-forming; they are threatened by recreational use of the area, and portions of the colony have been destroyed by trampling. The

species has also been reported from Suffolk County, Long Island.

D.E.C. Region: 3

County: Ulster

The Brown Crowberry is a small shrub with slender evergreen leaves which appear needle-like because their margins curl under. Clusters of male flowers, evident primarily as bunches of long purplish stamens, are born at the tips of the branches in early spring. Fruiting plants are rare in the New York State population. The plants might be mistaken for young, prostrate spruces.



BUSHY ROCKROSE, FROSTWEED (Rockrose Family, Cistaceae)

Helianthemum dumosum (Bickn.) Fern.

Status: Endangered in New York State (E-1)

Federally considered for listing.

Habitats: Dry, open meadows, downs and barrens; sedge mats under oaks.

Rarity: Restricted to the coastal area from Long Island to Eastern Massachusetts. *Helianthemum dumosum* is known from only a few stations throughout its range. In New York it has not been reported from Nassau County in over fifty years, and, con-

D.E.C. Region:
Counties:

sidering the development of the area, it probably does not occur there at present. Other populations toward the eastern end of the island may have fared a little better, but extensive development and successional change of the open downs to scrub and thickets have eliminated much habitat. Only three populations are presently known to persist.

1
Nassau, Suffolk

Two very rare Frostweeds occur in New York and are easily confused with common species; for convenience, both *Helianthemum dumosum* and *H. propinquum* (the following species) will be discussed here. *Helianthemums* produce two types of flowers: early in the season large, showy, yellow, petal-bearing flowers are produced; these are followed by small, brownish, inconspicuous, closed (cleistogamous) flowers. In both the rare species and the common *H. canadense*, the sepals of the petaliferous flowers are of two distinct lengths, whereas in another species, (*P. bicknellii*) they are all about the same size. The sepals of these three species all bear star-shaped, branched hairs; *H. dumosum* and *H. canadense*, but not *H. propinquum*, also bear long, straight hairs. Typically *H. canadense* produces only a single petal-bearing flower (rarely two) which is followed abruptly by cleistogamous ones. In contrast, *H. dumosum* produces a succession of petal-bearing flowers (which may gradually be reduced during the late season to cleistogamous ones). Both *H. canadense* and *H. propinquum* are upright-growing plants, whereas *H. dumosum* is low, profusely branched and spreading.

HOARY FROSTWEED (Rockrose Family, Cistaceae)

Helianthemum propinquum Bicknell

Status: Possibly extirpated from New York State (X-2)

Habitat: Dry, open meadows

Rarity: A coastal species, occurring from eastern Massachusetts to Maryland. This species has been found in New York only in the vicinity of Hempstead, Long Island, and has not been seen since 1925. The extensive development of this area since that time has probably eliminated it from the State, but it should be sought in dry open fields in the area.

D.E.C. Region: 1

County: Nassau

For separation from other species, see above with *H. dumosum*.



FEATHERFOIL (Primrose Family, Primulaceae)

Hottonia inflata Ell.

Status:

Threatened in New York State (T-2)

Rarity:

This is an aquatic plant which has a wide distribution in the eastern and midwestern U.S., but it is ephemeral. It has been known from many locations where it no longer occurs and may be considered rare and vulnerable.

Habitats:

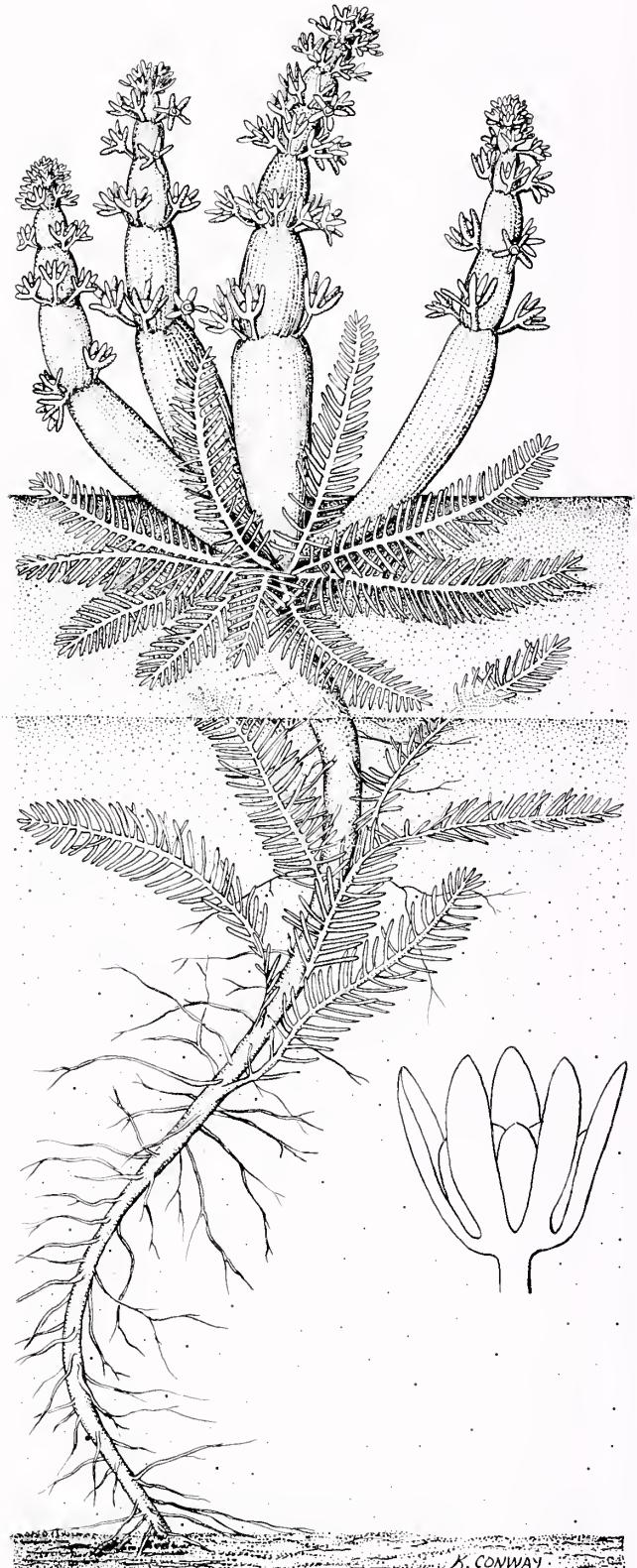
Usually shallow water (up to 4 feet) or stranded on mud. If in water the lower stem is submerged with upper, flowering stalks inflated and floating at the surface.

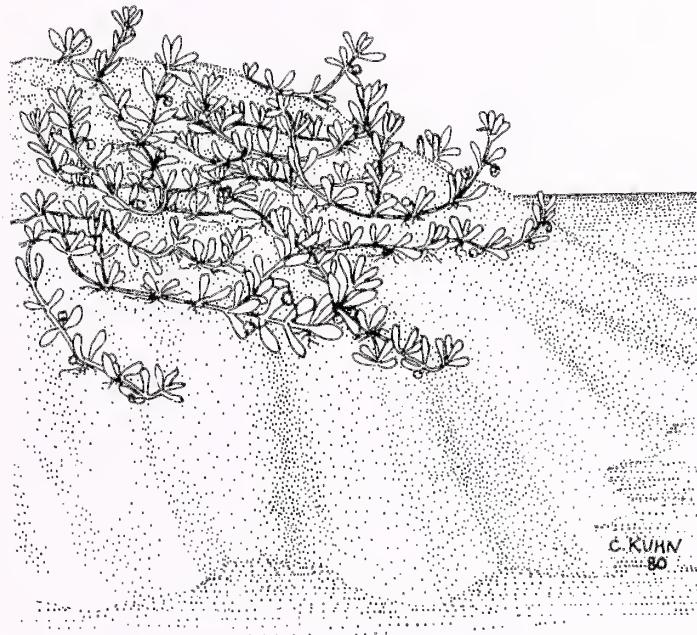
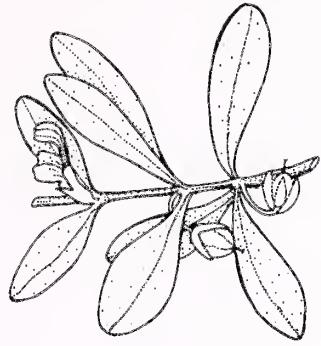
D.E.C. Regions: 1, 2, 3, 6

Counties:

Jefferson, Nassau, Richmond, Rockland, Suffolk (all 19th century records except Rockland and Suffolk Counties)

This is a very unusual looking plant which is not easily confused with others. Its underwater leaves are comb-like, resembling those of Water Milfoil (*Myriophyllum*), but the emerging stalks are greatly inflated and constricted at the joints, bearing small, white flowers.





MICRANTHEMUM (Figwort Family, Scrophulariaceae)

Micranthemum micranthemosides (Nutt.) Wettst.

Status: Endangered in New York State (E-1)

Possibly extinct. Federally considered for listing.

Rarity: This is a species which may be extinct. Though it has been reported from six states and the District of Columbia, recent government-sponsored searches have not turned it up. The Hudson River estuary still holds the best prospects for harboring these tiny plants.

Habitats: Estuary margins, muddy seepage banks and tidally influenced pools in shallows; fresh to slightly brackish water

D.E.C. Region: 3

County: Dutchess

Micranthemum is a tiny plant which grows in and around estuaries in a zone which is both unpleasant and dangerous to humans. In some areas strong tides constantly change the configuration of the mud banks and pools, such that *Micranthemum* may be covered up and/or migrate from place to place. It is a thread-like plant with spoon-shaped to oval leaves in pairs or threes. Flowers are whitish and inconspicuous and often drop before opening. The fruit is a tiny capsule borne on a slender stalk. When not flowering, these plants could easily be confused with species of Water Star-grass (*Callitriches*) or other small aquatics.

TORREY'S MUHLY (Grass Family, Poaceae)

Muhlenbergia torreyana (Schultes) Hitchc.

Status: Endangered in New York State (E-2)

Federally considered for listing.

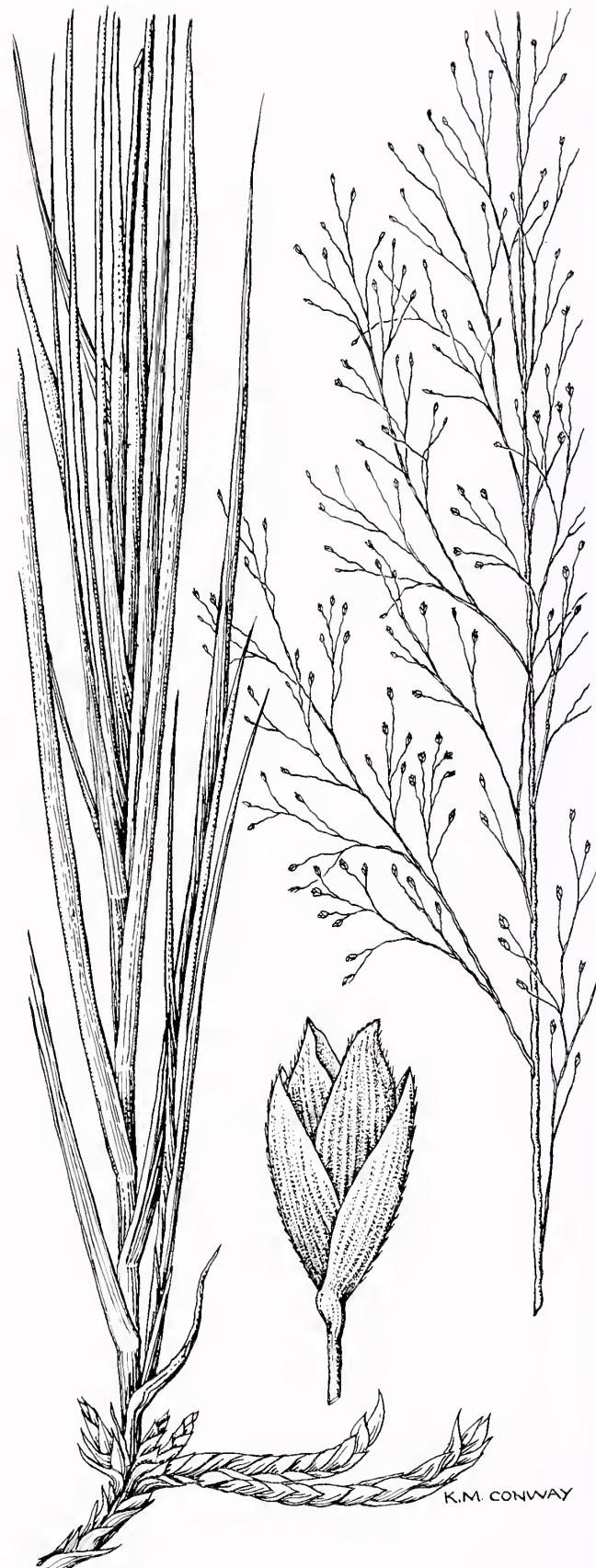
Rarity: This rare grass is distributed sparingly along the eastern seaboard in Delaware, New Jersey, New York and in Tennessee (formerly Kentucky and Georgia). It is apparently rare throughout its range, and is known from only a single site on Long Island in the 1830's. It is possibly extirpated in New York State, but might easily have been overlooked, and is to be sought in Suffolk County.

Habitats: Moist, peaty places in pine-barrens

D.E.C. Region: 1

County: Suffolk

Not to be confused with Ring-grass (*M. torreyi*), this species is most closely related to western Muhlies such as Scratchgrass (*M. asperifolia*). The inflorescence of *M. torreyana* is an oblong, open panicle, and the leaf sheaths are compressed and keeled. A species in the northeastern United States with which it may be confused is *M. uniflora*, which differs in having shorter outer floral parts and longer ligules.



(PANIC GRASS) (Grass Family, Poaceae)

Panicum scabriusculum Ell.

Status: Threatened in New York State (T-3)

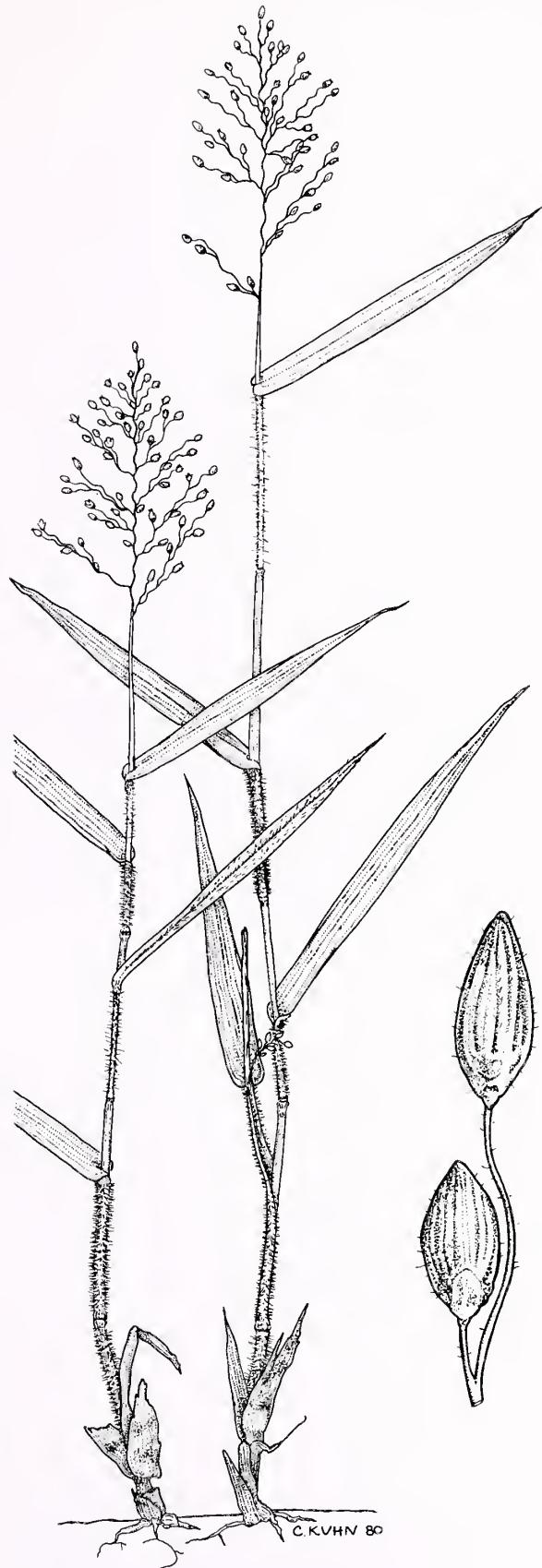
Rarity: Rare, southeastern Coastal Plain species very rare in the Northeast. Northeastern populations of this species have frequently been treated as a distinct species (*P. aculeatum* Hitchc. & Chase). As such, the plants were under consideration for listing in the federal level, but the taxonomic complexity of the group made determinations of rarity difficult. The northeastern *P. aculeatum* is now considered to represent the more northern populations of the essentially southeastern *P. scabriusculum*; the species is still rare, but not truly endangered nor threatened enough for federal listing

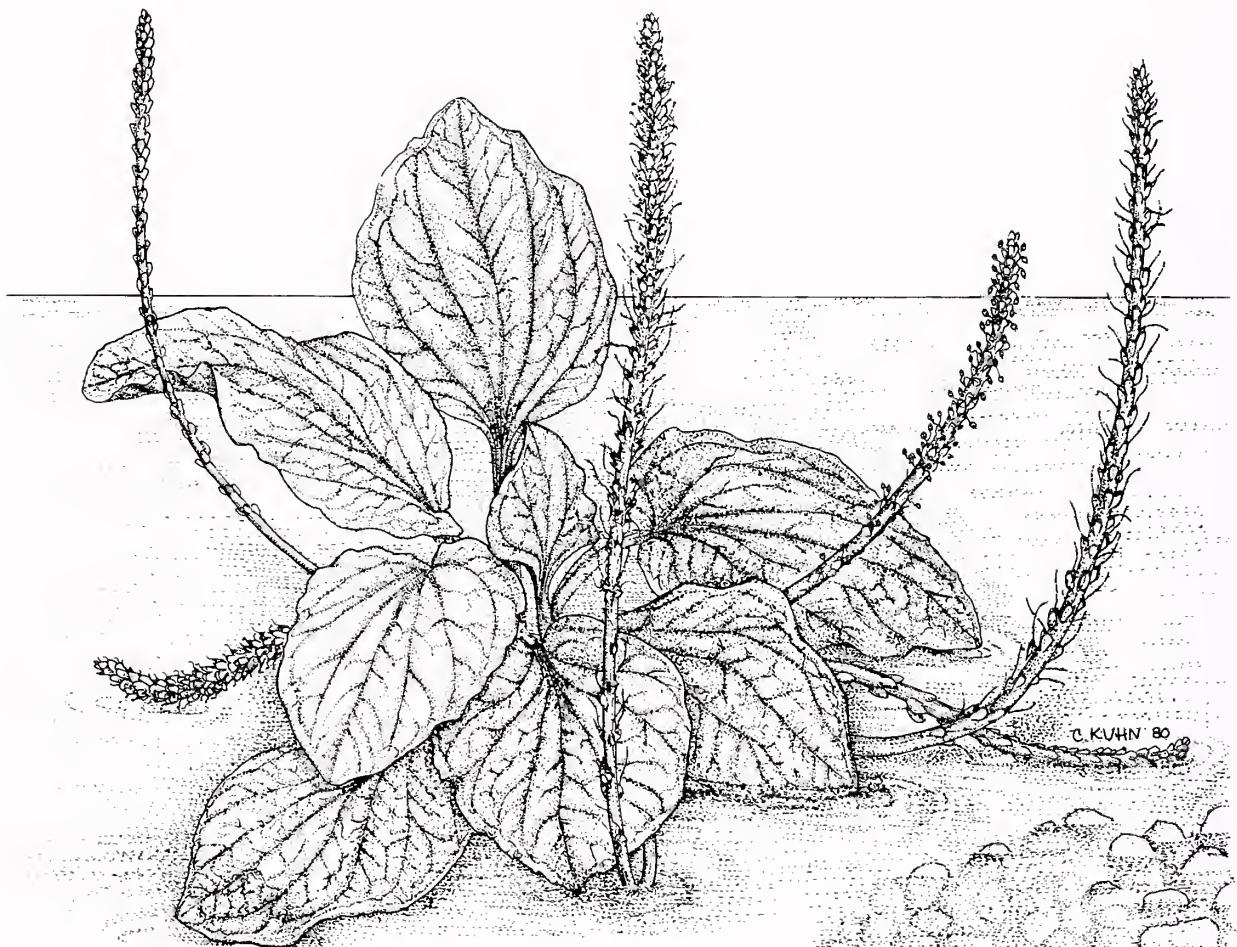
Habitats: The plant occurs in sandy soils, primarily along the coast. It is disjunct inland in the vicinity of Oneida Lake. It has not been reported in New York in over fifty years, and is doubtless largely extirpated on Long Island.

D.E.C. Regions: 1, 2, 6, 7

Counties: Nassau, Oneida, Oswego, Queens

Panicum scabriusculum is a stout, broad-leaved plant about one to two feet tall. Its leaf-sheaths are pubescent with long, spreading hairs. The large (about $\frac{1}{8}$ inch long) flowers and fruits are born in compact, branched clusters. The genus *Panicum* is very complex, and any specimens possibly referable to this species should be carefully determined or sent to a specialist for study.





HEARTLEAF PLANTAIN (Plantain Family, Plantaginaceae)

Plantago cordata Lam.

Status:	Threatened in New York State (T-1) Federally considered for listing.	Habitats:	Gravelly and mucky river and streambanks, usually in shade of forest areas or on their borders; plants may be under fresh or brackish tidal influence and may be submerged for part of each day.
Rarity:	This species is reported from ten states, from Wisconsin south to Alabama and Georgia, but it is quite rare in all but Missouri and New York State. In New York the plants are known from a 120-mile stretch of the estuarine Hudson River, mostly in populations of a few individuals. Most populations have probably seeded in down-river from the one thriving colony of about 3,000 plants. If this colony were destroyed, the future of the species in the Hudson would be doubtful.	D.E.C. Regions:	2, 3, 4

Counties: Albany, Bronx, Columbia, Dutchess, Greene, New York, Ulster

This species bears some superficial resemblance to the Common Plantain (*P. major*), but it is larger and grows in wet, often shady habitats. The broad leaves have strong midveins with some lateral veins branching from them, rather than a series of nearly equivalent convergent veins. Flowers are small, pale and numerous over most of the length of slender, arching stalks.

SLENDER MARSH BLUEGRASS (Grass Family,
Poaceae)

Poa paludigena Fern. & Wieg.

Status: Endangered in New York State (E-1)
Federally considered for listing.

Rarity: A very rare species of the Great Lakes region, *Poa paludigena* has been reported from a number of sites in central New York, but most of its stations have been destroyed. No populations are currently known to persist, and none have been reported in the last fifty years. The plant is very rare throughout its range, and its habitat requirements are not understood. The plant apparently occurs in calcareous wetlands, but often on *Sphagnum*; it does not seem to occur in deep acidic *Sphagnum* bogs, but rather in superficial mats overlying calcareous deposits. It should be actively sought.

Habitats: Open fens and bogs, often marly or calcareous areas; associated with peat moss at hummock borders.

D.E.C. Regions: 2, 6, 7, 8

Counties: Bronx, Chemung, Lewis, Monroe, Wayne, Tompkins

Like other Bluegrasses, this species is marked by leaves with boat-shaped tips. It is a very slender, weak-stemmed plant with an open, sparsely-flowered inflorescence. In New York, it is most likely to be confused with *P. sylvestris*. *Poa paludigena* is more slender, with narrower leaves and a smaller, more open inflorescence with, at most, three basal branches rather than four or more that are characteristic of *P. sylvestris*.



HILL'S PONDWEED (Pondweed Family, Potamogetonaceae)

Potamogeton hillii Morong

Status: Endangered in New York State (E-1)
Federally considered for listing.

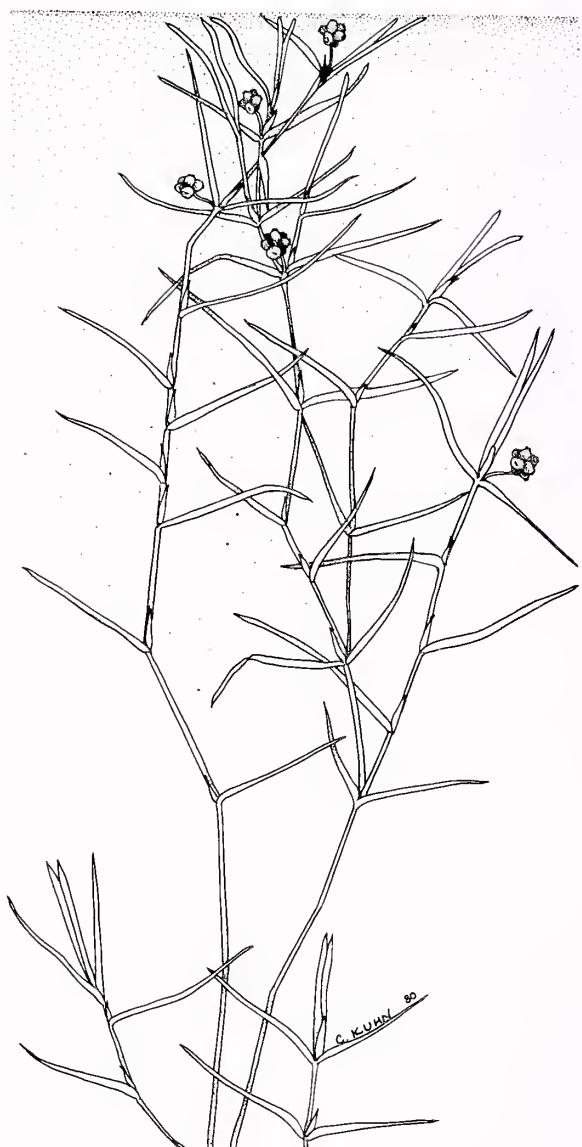
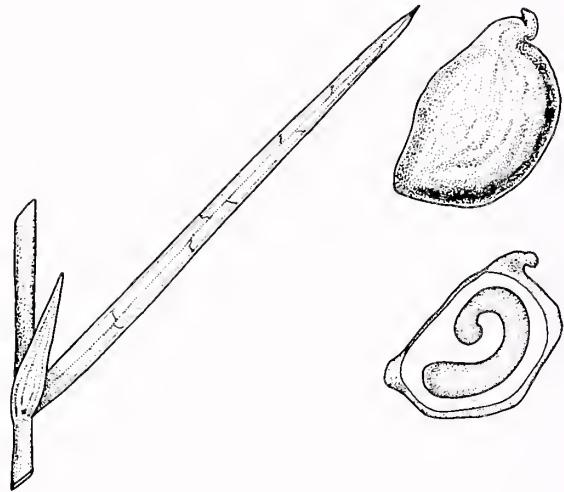
Rarity: These plants are found in situations where aquatic succession is taking place, and they do not appear to persist for long periods of time. This adds to the difficulty in determining overall rarity, since a number of historical sites are no longer intact, and several ponds no longer exist. The species is reported from Canada, Connecticut, Massachusetts, Missouri, New York, Ohio, Pennsylvania and Vermont. In New York State it has been reported at eight sites, of which it is known to survive at two.

Habitats: Lakeshores, beaver ponds and artificial impoundments, submerged in 1-4 ft. of water. Associated with high carbonates.

D.E.C. Regions: 4, 5, 7

Counties: Columbia, Dutchess, Tompkins,
Washington

These slender Pondweeds are easily confused with other narrow-leaved species, but they may be distinguished by a combination of leaf characters. A leaf has three major veins and a slender, short bristle at the tip.





BOOTT'S RATTLESNAKE-ROOT (Aster Family, Asteraceae)

Prenanthes boottii DC.

Status: Endangered in New York State (E-1)

boulders and talus of alpine summits and slopes.

Federally considered for listing.

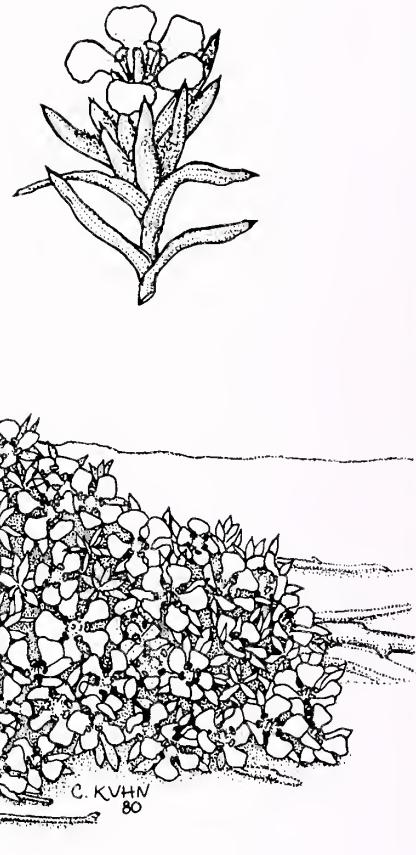
D.E.C. Region: 5

Rarity: Found on alpine summits in Maine, New Hampshire, New York and Vermont. Very rare in New York State, being known only from two frequently-visited Adirondack peaks and extirpated from another.

County: Essex

Habitats: Grassy meadows and soil between

These small plants may grow mixed with other *Prenanthes* species; they are distinguished by their whitish flowers, compared with yellow or dark cream in other Rattlesnake-roots. The leaves may have their bases sharply to bluntly lobed (not flared or ear-like), or one or both of the lobes may frequently be lacking.



PYXIES "FLOWERING MOSS" (Diapensia Family, Diapensiaceae)

Pyxidanthera barbulata Michx.

Status: Endangered in New York State (E-2)
 Rarity: A single station is known from New York State at the northern limits of the range of this Coastal Plain species. The plants are found in some abundance in the New Jersey Pine Barrens, scattered southward in sandy, coastal areas to Virginia. The Sandhills variety from inland in the Carolinas (var. *brevifolia*) is under review for Federal protection.

Habitats: Dry pine and oak woodland on shallow organic deposits over sand (often in burned-over areas)

D.E.C. Region: 1
 County: Suffolk
 These are some of the tiniest of flowering plants. They resemble mosses and are sometimes called "Flowering Moss." The minute stems and leaves spread in fine mats on the ground. The plants are covered with white to pinkish, 5-parted flowers in early spring.

PALE BEAKRUSH (Sedge Family, Cyperaceae)

Rhynchospora pallida Curtis

Status: Endangered in New York State (E-2)

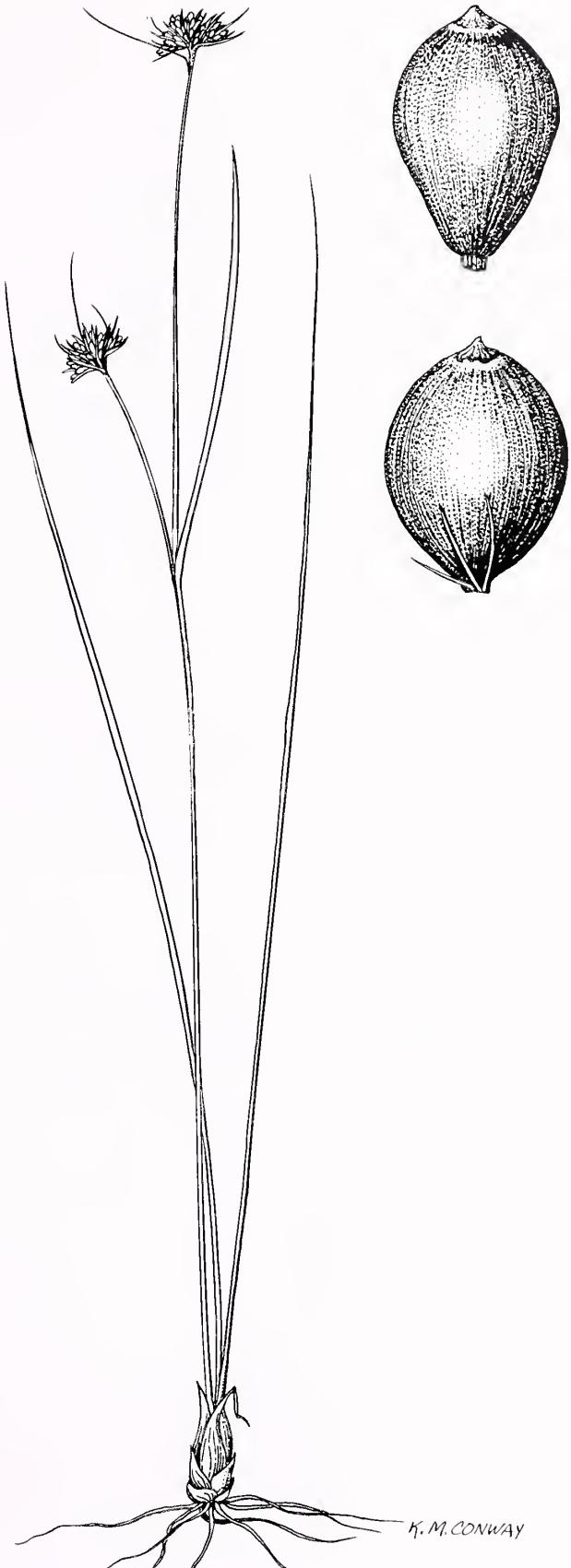
Rarity: This rare sedge species is at its northern limits at the only known New York State location in central Long Island. It ranges to North Carolina, and is listed in the endangered plant lists of Delaware, Maryland and Virginia, apparently being very local throughout its range.

Habitats: Wet depressions and boggy places in pinelands; cedar swamps

D.E.C. Region: 1

County: Suffolk

Pale Beakrush bears its flowers in dense clusters at the stem tips. It has bulbous bases, unlike many other species. It differs from similar looking Beakrushes (*R. fusca* and *R. filiformis*) in having 1–3 very short bristles (or none) at the base of each seed-like fruit (rather than 6 longer ones). It is distinguished from *R. grayi* by its smooth fruits.



QUILL-LEAVED ARROWHEAD (Waterplantain

Family, Alismaceae)

Sagittaria teres Wats.

Status: Threatened in New York State (T-2)

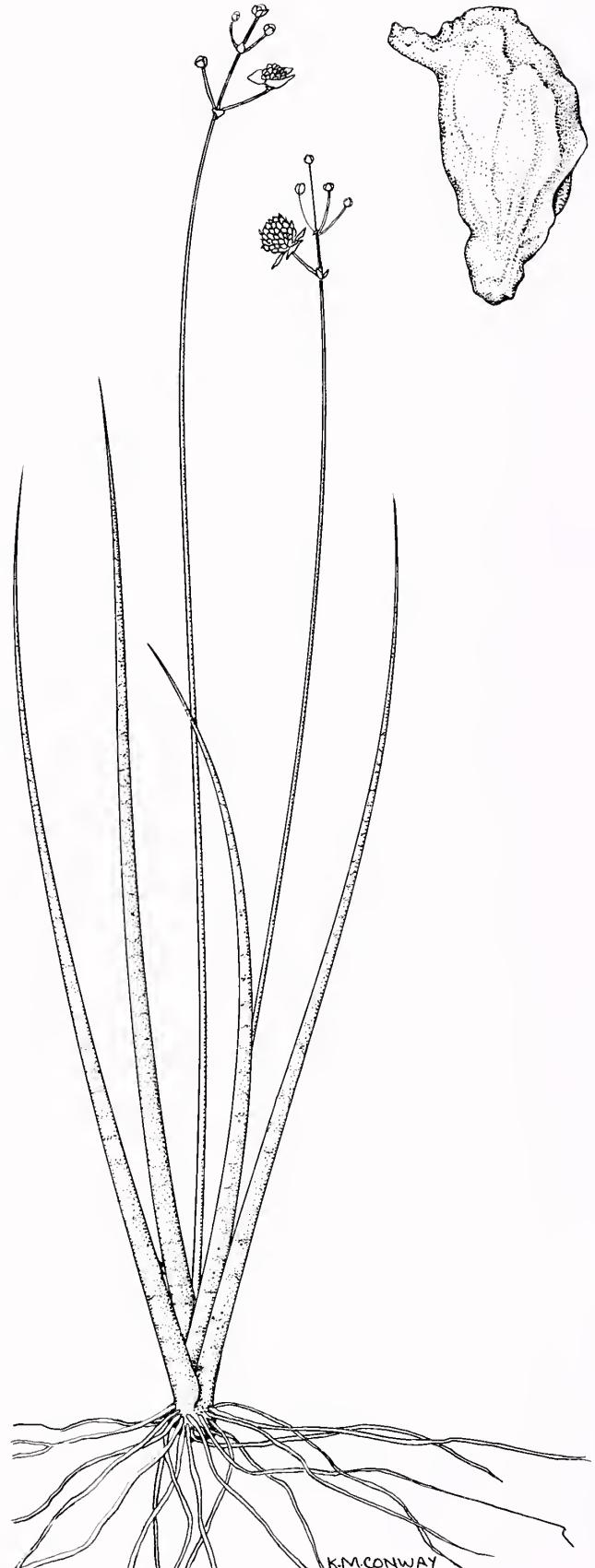
Rarity: This species has a spotty distribution, occurring primarily on Cape Cod. It is scattered sparsely from Long Island, New York, down the Atlantic coast to eastern Maryland. It is rare and vulnerable, reported as a declining wetland species in the endangered plant lists of Maryland, Delaware and Massachusetts.

Habitats: Moist, sandy shores and swamp borders

D.E.C. Region: 1

County: Suffolk

This species may be told from similar ones (like *S. graminea*) by its quill-like leaves (phyllodes) which are circular in cross section rather than flattened. The leaves are usually also segmented and are from 6 inches to 2 feet tall. Flowers are white and the fruits are borne in dense, bur-like heads.



KM CONWAY

NORTHERN BULRUSH (Sedge Family, Cyperaceae)

Scirpus ancistrochaetus Schuyler

Status: Possibly extirpated from New York State (X-1); Federally considered for listing.

Rarity: This is a sporadically distributed entity, known from a few sites in Massachusetts, New York, Pennsylvania, Vermont and Virginia. Since it may easily be mistaken for more common Bulrushes, it may be widely overlooked.

Habitats: Marshy places, sedge-meadows and fens

D.E.C. Region: 5

County: Washington

These plants are very difficult to distinguish from a common Bulrush (*S. atrovirens*), the most reliable character being microscopic. Around the seed-like fruits are bristles which have tiny, backward-directed barbs which are thick at the base (Fig. 48) and resemble the fangs of a snake. Such barbs in *S. atrovirens* are slender. The single New York State specimen was collected at "Mt. Nebo, 1,800 ft.," a location that many old maps and the aid of the Washington County Historical Society have not enabled us to find. This perplexing specimen also has a packet containing three types of fruits: 1) those corresponding with *S. ancistrochaetus* 2) those like *S. atrovirens* and 3) intermediates, suggesting possible hybridization at the site if several plants were sampled.



LONG'S BULRUSH (Sedge Family, Cyperaceae)

Scirpus longii Fern.

Status: Probably extirpated in New York State (X-1); Federally considered for listing.

Rarity: This species was formerly known from six stations in Massachusetts, one in Connecticut and one in New York, but is probably extirpated in all these. The plants are still known from New Jersey.

Habitat: Meadows and marshes.

D.E.C. Region: 2

County: Queens

This species of sedge grows 2–5 ft. tall with tough, underground stems (rhizomes) and leaves which are strap-shaped and borne in clumps. It flowers seldom and is less likely to be collected than its common relatives. When it flowers, a plant will produce a tall stalk topped by a branched cluster of woolly spikelets. Its nearest relative is *Scirpus atrocinctus*, from which it may be distinguished by the glutinous base of its main flower cluster and by its fruits which are chestnut-brown when ripe rather than pale.



HOUGHTON'S GOLDENROD Aster Family,
Asteraceae)

Solidago houghtonii T. & G.

Status: Threatened in New York State (T-1)
Federally considered for listing.

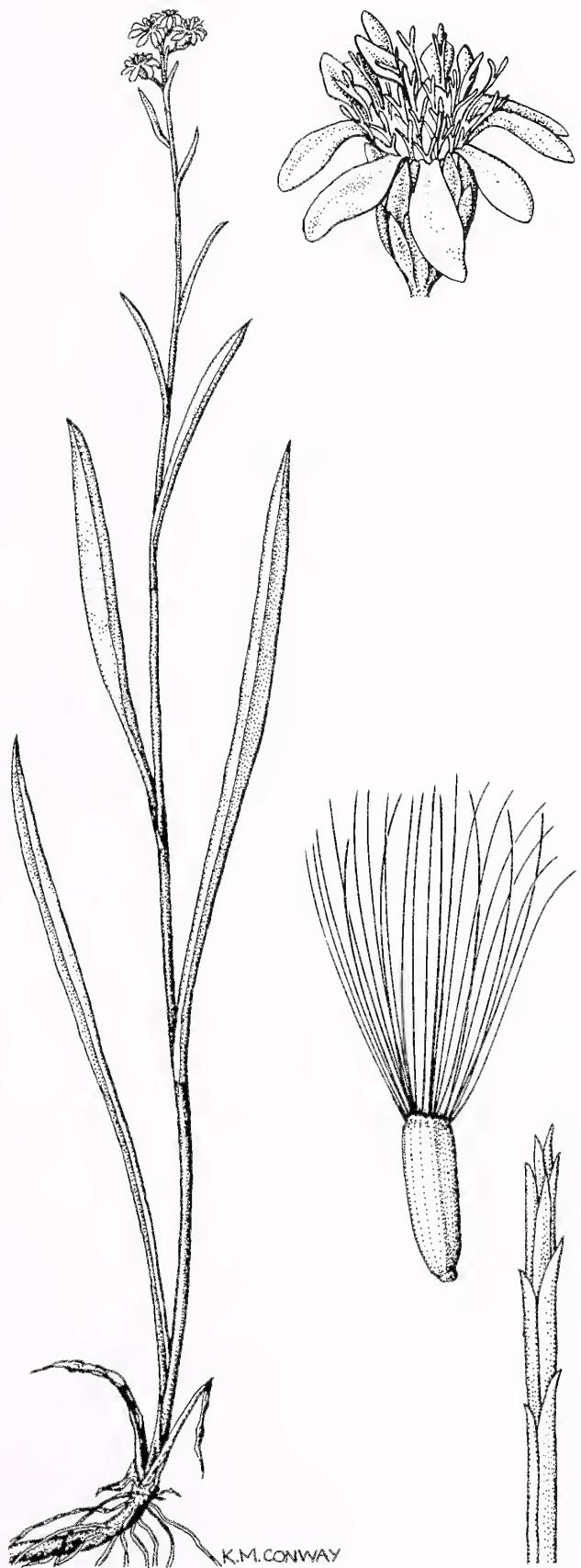
Rarity: A rare and very restricted plant of
the shores of northernmost Lakes
Michigan and Huron, this species is
disjunct at a single station in western
New York. The New York popula-
tion is protected by the ownership of
a private conservation organization,
but is threatened by invasion of
Common Reed, *Phragmites com-
munis*.

Habitat: This species occurs in open sand and
on limestone outcroppings in the
principal portion of its range; in New
York it occurs in marly fen
meadows.

D.E.C. Regions: 8

Counties: Genesee

The genus *Solidago* is large and complex, and identifi-
cation of plants can be difficult. Houghton's Goldenrod
is unusual, however, and can be distinguished by its
dense, somewhat flat-topped cluster of 5–15 rather
large flower-heads and narrow (generally less than $\frac{1}{2}$
inch wide) leaves which lack small glandular spots. *Sol-
idago houghtonii* has been reported to have arisen
through hybridization of *S. ohioensis* and *S. ptarmi-
coides*, and can be confused with occasional hybrids of
these species. The New York plants have been re-
ferred to such hybrids in the literature, but our recent
chromosome studies indicate that New York plants are
the polyploid *S. houghtonii* or a separately derived en-
demic species.





BUFFALO CLOVER (Bean Family, Fabaceae)

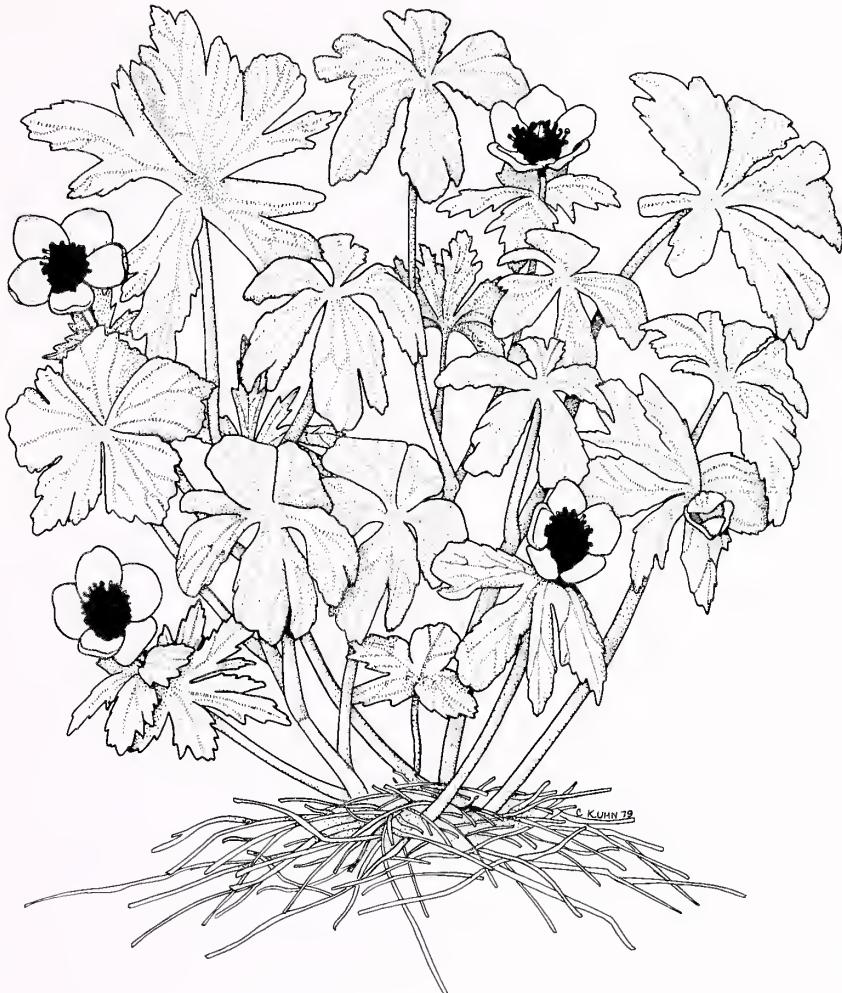
Trifolium reflexum L. var. *glabrum* Lojac
 Status: Probably extirpated from New York State (X-2)
 Rarity: A rare, midwestern plant found eastward very rarely in the Great Lakes region. *Trifolium reflexum* occurs primarily in the southeast and midwest; the midwestern and more northern populations represent var. *glabrum*. The species has disappeared throughout much of its range, and has not been correctly reported from New York State in this century. It is an annual or biennial which appears to be very sus-

ceptible to extirpation; it very likely has been lost from New York's flora. Prairies, barrens, open woods, and clearings.

D.E.C. Regions: 6, 7, 8

Counties: Broome, Monroe, Oneida, Onondaga, Wayne.

Buffalo Clover is a showy species with large heads of red and white or pinkish flowers. The individual flowers have very long calyx lobes (free segments 2-4 times as long as the fused basal portions) and are borne on long pedicels (up to $\frac{1}{2}$ inch long), resulting in a large, loose head of flowers. These two characteristics distinguish it from the common Alsike Clover (*T. hybridum*).



GLOBEFLOWER (Crowfoot Family Ranunculaceae)

Trollius laxus Salisb. ssp. *laxus*

Status: Threatened in New York State (T-1)
Federally considered for listing.

Rarity: The typical subspecies of Globeflower is a rare native of the eastern United States, known from Connecticut, New Jersey, New York, Pennsylvania and Ohio. Subspecies *albiflora* has white to cream, rather than yellow flowers, is less rare, and ranges from the Rocky Mountains to the west coast. New York State has the greatest number of populations and individuals of the eastern subspecies, but it is still a rarity, being mostly extirpated in the southern counties.

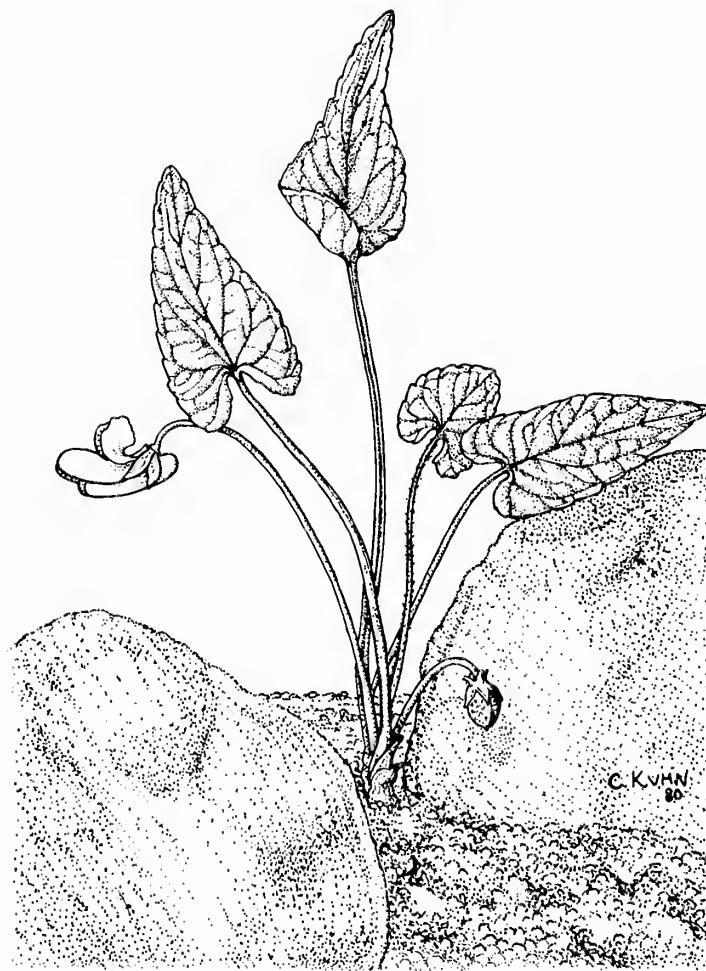
Habitats: Marly swales and hummocky meadows on wet ground, to swamp forests in which they are apparently

eventually shaded out. Plants grow in transition zones between forest and wet clearings where grazing animals are often a problem.

D.E.C. Regions: 3, 4, 6, 7, 8, 9

Counties: Bronx, Cayuga, Chautauqua, Erie, Genesee, Herkimer, Livingston, Madison, Monroe, Oneida, Onondaga, Ontario, Orange, Otsego, Rockland, Schenectady, Schuyler, Sullivan, Tompkins, Ulster, Westchester, Wyoming.

The Globeflower of the eastern United States is a showy plant with yellow to bright cream-colored flowers about an inch in diameter, much like those of a Buttercup (*Ranunculus*). Flowers differ from Buttercups in having an extra series of blunt, sterile lobes with the stamens (Fig. 52). The leaves are variable and palmately cut and lobed. The plants are vulnerable to wildflower gardeners and grow in habitats particularly subject to natural and man-made change.



NEW ENGLAND VIOLET (Violet Family, Violaceae)

Viola novae-angliae House

Status: Endangered in New York State (E-1)
Federally considered for listing.

Rarity: *Viola novae-angliae* is a rare species throughout most of its range, from New England to the Great Lakes region; it is known from Maine, Michigan, Minnesota, New York and Wisconsin; it is a sporadically distributed species, being relatively common only in the western Lake Superior region.

Habitat: It occurs in sandy and gravelly pockets among cobbles and other rocks along water courses. It seems to require open situations, and since streambanks and shores of its region

are generally thicketed and forested, habitat is rare. The area where it grows in New York State has been devastated year after year by ice-rafting. By 1980 the known New York population was three plants, but about two dozen more were found in 1981.

D.E.C. Region: 5

County: Warren

Viola novae-angliae is one of the blue-purple flowered species with unlobed leaves. Within this group of species, it is distinct in its relatively long, rather triangular leaves which are at least as long as broad, and often longer. When flattened, the leaves of the other species tend to be broader than long.

Widespread Plants Threatened by Commercial Demand

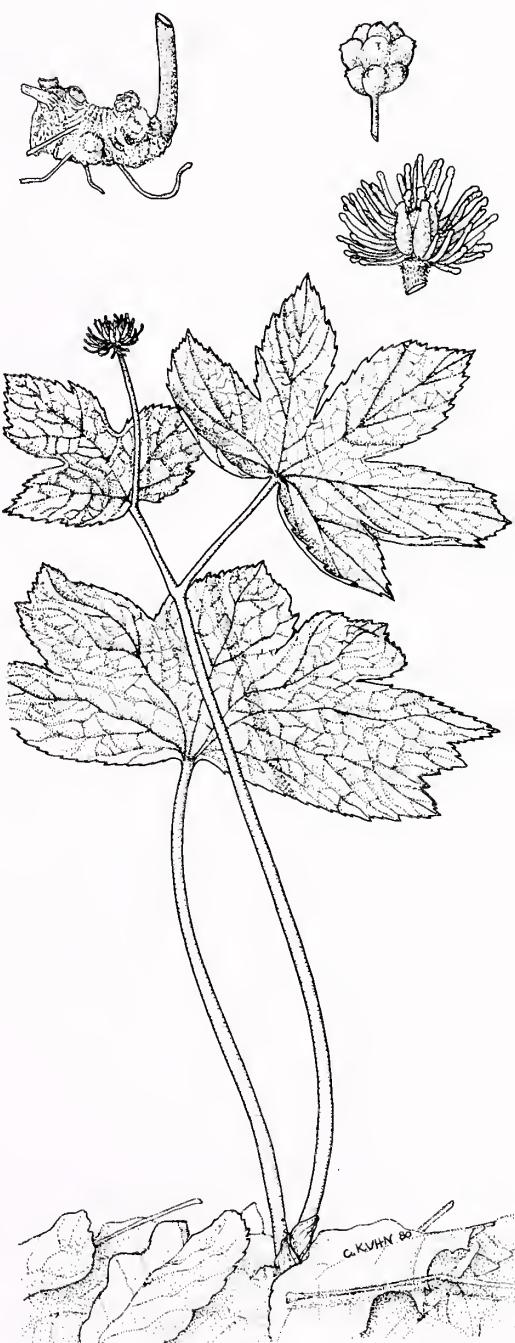
There has long been a market for natural herbs and remedies, but most intensive gathering in the past was for export purposes, especially to the Orient. With increased popularity in the United States and Canada of "back-to-nature" books, modern herbals and cookbooks, collecting pressure on native plants has grown. Two herbs of the eastern American forests have been sought out more intensively than others, due to the price they will bring: Ginseng (*Panax*) and Golden-seal (*Hydrastis*). Ginseng was once a common plant, but Golden-seal has never been very frequent, especially in the northern part of its range. Management of these species is being considered by most states in which they occur, and programs have been initiated by some state conservation agencies. The Department of Environmental Conservation of New York State has Ginseng management responsibility, and should be consulted on matters pertaining to that species.

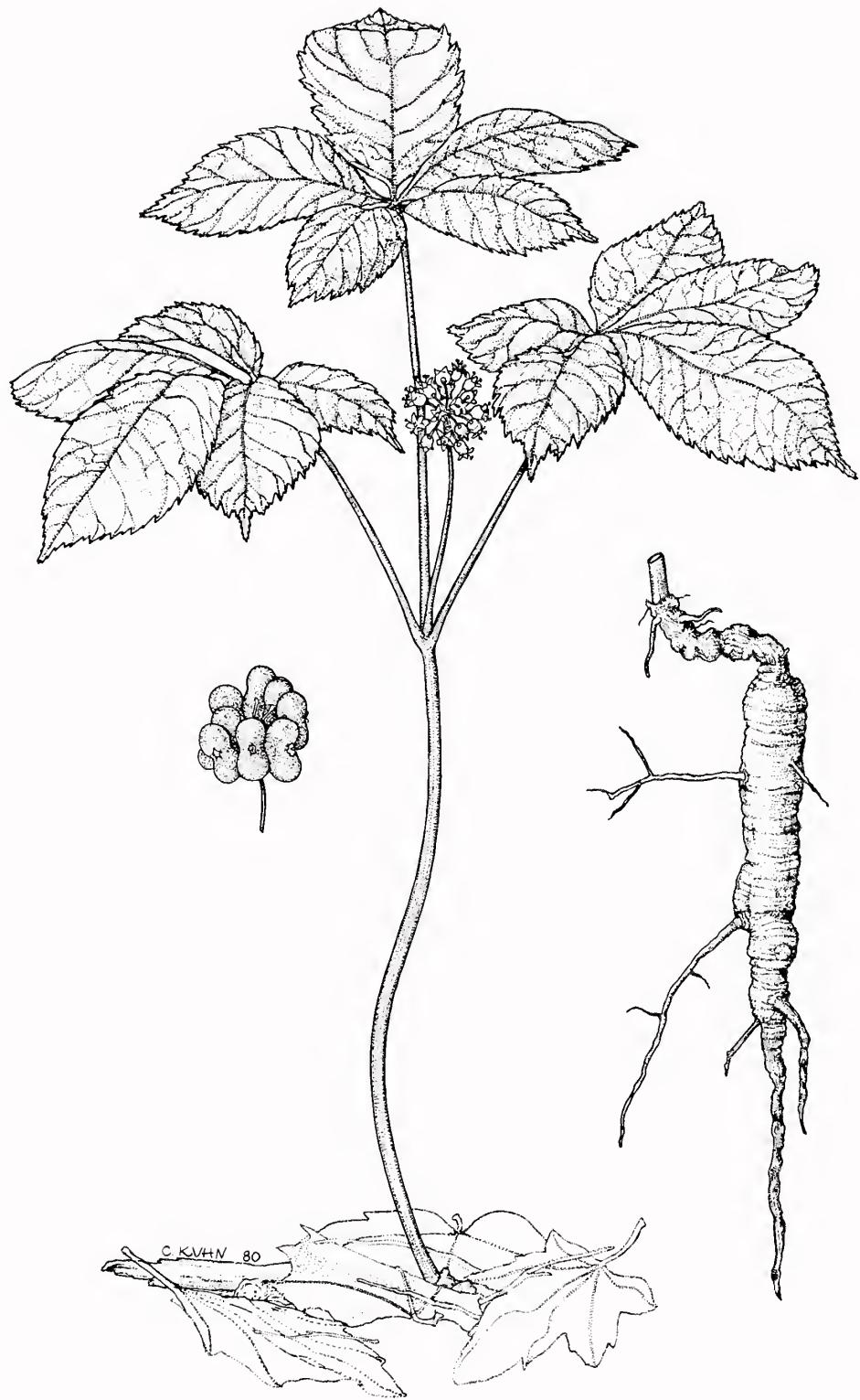
GOLDEN-SEAL, YELLOW PUCCON (Crowfoot Family, Ranunculaceae)

Hydrastis canadensis L.

Status:	Commercially exploited; protected in New York State (C-1)
Rarity:	Known in 23 states and Canada in eastern North America, but uncommon in New York State with sites mostly confined to the central and western counties.
Habitats:	Rich soil and humus, often on forest floors near the bases of limestone cliffs and slopes
D.E.C. Regions:	3, 4, 5, 6, 7, 8, 9
Counties:	Cayuga, Columbia, Erie, Genesee, Madison, Monroe, Niagara, Oneida, Onondaga, Orange, Rensselaer, Saratoga, Schuyler, Seneca, Tompkins, Wayne, Yates

These plants are quite distinctive, bearing only two or three broad, toothed leaves (Fig. 54). The single flower is not conspicuous, and derives its color primarily from numerous, white stamens. The fruits are red berries, borne in a dense head. The root is knotty, tuberous and yellowish, and is the part collected for use as an herb. Extracts of the roots are used in preparations for membrane inflammations, intestinal disorders and sore eyes. Roots contain Berberine and are known to be astringent, laxative and anti-bacterial in action.





AMERICAN GINSENG *Panax quinquefolius*. The popularity of this herb in folk medicine, first in the Orient and more recently in the western world, has led to its serious depletion. Though it may be grown commercially, the wild-grown roots are distinguishable and draw a much higher price from Ginseng and fur dealers. Regulation by federal and state agencies will no doubt take many forms in the future with increasing export restrictions and population monitoring.

GINSENG (Aralia Family, Araliaceae)*Panax quinquefolius* L.

Status:	Export regulated under terms of the Convention on International Trade in Rare and Endangered Species of Wild Flora and Fauna; commercially exploited; protected in New York State (C-3)
Rarity:	Widespread in the deciduous forests of the eastern and midwestern United States and adjacent Canada. Seriously depleted due to commercial collection for drug use.
Habitat:	Rich, deciduous forests
D.E.C. Regions:	All
Counties:	Albany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Columbia, Cortland, Erie, Essex, Delaware, Dutchess, Genesee, Greene, Hamilton, Herkimer, Jefferson, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Rensselaer, Rockland, Saratoga, Schenectady, Seneca, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren Washington, Wayne, Westchester, Wyoming, Yates.

Ginseng is not readily confused with other plants in our area. Its close relative, Dwarf Ginseng, is a much smaller plant with leaves composed of three leaflets rather than five as in Ginseng. Occasionally, Wild Sarsaparilla (*Aralia nudicaulis*) is confused with it, but this plant does not have the whorl of terminal leaves surrounding the flower cluster as Ginseng does; rather, the leaf and flowers are borne on different stalks arising separately from the ground. Ginseng was originally a common and widespread plant in much of the forested region of the eastern United States and Canada. It was early recognized as a suitable substitute for Chinese Ginseng (*P. pseudoginseng*), known as a panacea in oriental folk medicine. Its medical and mystical properties have placed it in such high demand that widespread and intensive collection for export has seriously depleted populations throughout its range. Commercial collectors and others interested in the plant often ascribe very strict habitat requirements to the species. It is frequently said to require particular slopes, moisture regimes, and certain species of hardwood cover. In fact, these preferences seem more to reflect past collecting pressures and land-use patterns, for the species occurs in a great variety of forest types and even colonizes old farmland and roadsides. It seems primarily to require moderate shade and a moist, rich soil that is not too acidic. This latitude of tolerance is reflected in the wide range of the species.

Rare Plant Species Recommended for High Priority Protection in New York State

The following species are considered by the authors to be qualified for protection in New York on the basis of overall rarity and/or vulnerability to commercial exploitation. High on this priority list are species studied federally and found to be in need of protection. Certain species not listed federally, however, are very rare in New York State and elsewhere, and these are

also included here for State protection. A number of widely known rarities of the northeastern United States will not be found listed here, since they are relatively common elsewhere in North America, Europe or Asia. In a few cases commercial demand and collecting pressure were taken into consideration when listing a species.

1. *Botrychium minganense* Victorin

MINGAN MOONWORT

Family: Ophioglossaceae (Adder's-tongue Family)

Status: New York State E-2

2. *Botrychium ternatum* (Thunb.) Sw.

TERNATE GRAPE FERN

Family: Ophioglossaceae (Adder's-tongue Family)

Status: New York State T-2

3. *Lygodium palmatum* (Bernh.) Sw.

CLIMBING FERN

Family: Schizaeaceae (Curlygrass Family)

Status: New York State E-2 (also commercially exploited)

4. *Schizaea pusilla* Pursh

CURLYGRASS

Family: Schizaeaceae (Curlygrass Family)

Status: New York State E-1 (Federally considered for listing)

5. *Phyllitis scolopendrium* (L.) Newm.

HART'S-TONGUE

Family: Polypodiaceae (Polypody Family)

Status: New York State E-1 (Federally considered for listing)

6. *Woodsia oregana* D.C. Eaton var. *cathcartiana* (Rob.) Mort.

CATHCART'S WOODSIA, "OREGON WOODSIA"

Family: Polypodiaceae (Polypody Family)

Status: New York State E-1 (Federally considered for listing)

7. *Potamogeton hillii* Morong

HILL'S PONDWEED

Family: Potamogetonaceae (Pondweed Family)

Status: New York State E-1 (Federally considered for listing)

8. *Sagittaria teres* Wats.

QUILL-LEAVED ARROWHEAD

Family: Alismaceae (Water Plantain Family)

Status: New York State T-2

9. *Muhlenbergia torreyana* (Schultes) Hitchc.

TORREY'S MUHLY

Family: Poaceae (Grass Family)

Status: New York State E-2 (Federally considered for listing)

10. *Poa paludigena* Fern. & Wieg.

SLENDER MARSH BLUEGRASS

Family: Poaceae (Grass Family)

Status: New York State E-1 (Federally considered for listing)

11. *Rhynchospora pallida* Curtis

PALE BEAKRUSH

Family: Cyperaceae (Sedge Family)

Status: New York State E-2

12. *Corallorrhiza striata* Lindl.

STRIPED CORALROOT

Family: Orchidaceae (Orchid Family)

Status: New York State E-2

13. *Cypripedium arietinum* R. Br.

RAM'S-HEAD LADYSLIPPER

Family: Orchidaceae (Orchid Family)

Status: New York State T-1 (Federally considered but not listed)

14. *Cypripedium candidum* Muhl. ex Willd.

SMALL WHITE LADYSLIPPER

Family: Orchidaceae (Orchid Family)

Status: New York State E-1 (Federally considered but not listed)

15. *Platanthera leucophaea* (Nutt.) Lindl.

PRAIRIE WHITE-FRINGED ORCHID

Family: Orchidaceae (Orchid Family)

Status: New York State E-1 (Federally considered for listing)

16. *Isotria medeoloides* (Pursh) Raf.

SMALL WHORLED POGONIA

Family: Orchidaceae (Orchid Family)

Status: Federally proposed as Endangered; New York State E-1

17. *Listera auriculata* Wieg.
AURICLED TWAYBLADE
Family: Orchidaceae (Orchid Family)
Status: New York State E-1 (Federally considered for listing)

18. *Aconitum noveboracense* A. Gray
NORTHERN MONK'S-HOOD
Family: Ranunculaceae (Crowfoot Family)
Status: Federally listed Threatened; New York State T-1

19. *Hydrastis canadensis* L. **GOLDEN-SEAL, ORANGE-ROOT, YELLOW PUCCOON**
Family: Ranunculaceae (Crowfoot Family)
Status: New York State C-1 (rare and commercially vulnerable)

20. *Trollius laxus* Salisb. ssp. *laxus*
GLOBEFLOWER
Family: Ranunculaceae (Crowfoot Family)
Status: New York State T-1 (Federally considered for listing)

21. *Cardamine longii* Fern.
LONG'S BITTERCRESS
Family: Brassicaceae (Mustard Family)
Status: New York State T-1 (Federally considered for listing)

22. *Helianthemum dumosum* (Bickn.) Fern.
BUSHY ROCKROSE
Family: Cistaceae (Rockrose Family)
Status: New York State E-1 (Federally considered for listing)

23. *Viola novae-angliae* House
NEW ENGLAND VIOLET
Family: Violaceae (Violet Family)
Status: New York State E-1 (Federally considered for listing)

24. *Pyxidanthera barbulata* Michx.
PYXIES, "FLOWERING MOSS"
Family: Diapensiaceae (Diapensia Family)
Status: New York State E-2

25. *Hottonia inflata* Ell.
FEATHERFOIL
Family: Primulaceae (Primrose Family)
Status: New York State T-2

26. *Micranthemum micranthemooides* (Nutt.) Wettst.
MICRANTHEMUM
Family: Scrophulariaceae (Figwort Family)
Status: New York State E-1 (possibly extinct; Federally considered for listing)

27. *Plantago cordata* Lam.
HEARTLEAF PLANTAIN
Family: Plantaginaceae (Plantain Family)
Status: New York State T-1 (Federally considered for listing)

28. *Prenanthes boottii* DC.
BOOTT'S RATTLESNAKE-ROOT
Family: Asteraceae (Aster Family)
Status: New York State E-1 (Federally considered for listing)

29. *Solidago houghtonii* T. & G.
HOUGHTON'S GOLDENROD
Family: Asteraceae (Aster Family)
Status: New York State T-1 (Federally considered for listing)

Species Formerly Known From New York State

Once a species has been reported from the State and verified by a specimen, photo or site visit, it then becomes unwise to delete it from the flora, even if known populations have been extirpated. Almost any species discussed below could turn up in the State during our next field season, and these species should be protected if they do. Of the following species, however, most were known from single populations outside their continuous distribution ranges. Others have simply not been found for so long that their reappearance seems unlikely. Past occurrences based on heresay or reported in journals without citation of a voucher specimen are recorded in our files, but not reported here.

Appendix I. Species Probably Extirpated from New York State

Species	Status	Comments
<i>Cheilanthes lanosa</i> (Michx.) Eat. Woolly Lip-fern	X-3	Last seen (NY) 1888
<i>Pinus echinata</i> Mill. Shortleaf Pine	X-3	Native plants not distinguished from planted ones in its highly urbanized range in NY
<i>Pinus virginiana</i> Mill. Virginia Pine	X-3	Former habitat highly urban, as above
<i>Potamogeton lateralis</i> Morong Pondweed	X-2	Known from Hemlock Lake, 1883, only (in NY)
<i>Deschampsia atropurpurea</i> (Wahl.) Sheeble Mountain Hairgrass	X-3	Last seen in NY on Whiteface Mountain, 1851
<i>Carex capillaris</i> L. Hair-like Sedge	X-3	Last seen (NY) 1894, present site of Cortland waterworks
<i>Carex polymorpha</i> Muhl. Sedge	X-2	Vulnerable, sporadic rarity, last seen (NY) Oakdale, 1929
<i>Cyperus plukenetii</i> Fern. Rough Cyperus	X-3	Last seen (NY) 1868, Staten Island
<i>Eleocharis tortilis</i> (Link) Schult. Twisted Spikerush	X-3	Last seen (NY) 1903, Long Island
<i>Eleocharis wolfii</i> A. Gray Wolf's Spikerush	X-2	A prairie disjunct on Long Island. Only reported from Queens, 1927.
<i>Scirpus ancistrochaetus</i> Schuyler Northeastern Bulrush	X-1	Last seen (NY) 1900, "Mt. Nebo" Washington Co. "1,800 ft."
<i>Scirpus longii</i> Fern. Long's Bulrush	X-1	Only NY specimen from Aqueduct, Queens Co., 1905
<i>Commelinia erecta</i> L. Day-Flower	X-3	Only NY collection from NYC, 1905
<i>Amianthium muscaetoxicum</i> (Walt.) Gray, Fly-poison	X-3	Last seen 1926; known from NY in Queens and Nassau Counties only
<i>Narthecium americanum</i> Ker. Yellow Asphodel	X-1	Last seen (NY) White Plains, 1880

Species	Status	Comments
<i>Helonias bullata</i> L. Swamp Pink	X-3	Only NY record from Staten Island, 1880's
<i>Smilax pseudo-china</i> L. False China-root	X-3	Last seen NYC, 1903
<i>Amerorchis rotundifolia</i> (Banks) Hultén Round-leaved Orchis	X-2	Very rare in U.S.; not seen (NY) since 1881
<i>Castanea pumila</i> (L.) Mill. Chinquapin	X-3	Last reported (NY) on Staten Island in the 1840's
<i>Quercus phellos</i> L. Willow Oak	X-3	Last NY report 1914; now cultivated within its old natural range
<i>Phoradendron flavescens</i> (Pursh) Nutt. American Mistletoe	X-3	Last reported from Staten Island in the 1880's
<i>Anemone multifida</i> Poir. Cut-leaved Anemone	X-3	Very rare in eastern U.S.; last seen (NY) 1840's
<i>Isopyrum biternatum</i> (Raf.) T.& G. False Rue Anemone	X-3	Only specimen (NY) Buffalo, 1830's
<i>Ranunculus rhomboideus</i> Goldie Prairie Buttercup	X-3	Known from a single NY specimen with no location data, early 1800's
<i>Geum triflorum</i> Pursh Prairie Smoke	X-3	Rare in eastern U.S.; last seen (NY) 1840's
<i>Clitoria mariana</i> L. Butterfly Pea	X-3	Last seen (NY) near Brooklyn, ca. 1840
<i>Stylosanthes biflora</i> (L.) B.S.P. Pencil-flower	X-3	Last seen (NY) Inwood, Long Island 1867
<i>Trifolium reflexum</i> L. Buffalo clover	X-2	Not reported since 1890's, declining throughout range
<i>Hypericum kalmianum</i> L. Kalm's St. John's-wort	X-3	Only known (NY) from Niagara Falls, 1901
<i>Helianthemum propinquum</i> Bickn. Hoary Frostweed	X-3	Last reported (NY) 1901, Hempstead, Long Island
<i>Eryngium aquaticum</i> L. Eryngo	X-3	Single (NY) 19th century Staten Island specimen
<i>Thaspium trifoliatum</i> (L.) Britt. Three-leaved Meadow-parsnip	X-3	Known in NY from Staten Island prior to 1879
<i>Dodecatheon meadia</i> L. Shooting-star	X-3	Only collection (NY) near Bath, 1888
<i>Sabatia angularis</i> (L.) Pursh Rose-pink	X-3	In NY, only from New Dorp (1879), Manhattan (1811)
<i>Sabatia dodecandra</i> (L.) B.S.P. Sea-pink	X-3	Known (in NY) only from Harlem and Iona Island, before 1886
<i>Agalinis acuta</i> Pennell Gerardia	X-1	Rare coastal plain species not recorded on Long Island since the 1920s
<i>Schwalbea americana</i> L. Chaffseed	X-2	Single (NY) specimen from Karner, 1860's
<i>Aster shortii</i> Lindl. Short's Aster	X-3	Last seen (NY) at Niagara Falls, 1888

Significance Symbols Used In Appendix II.

DECL = Observed to be declining in New York State
 DISJ = Disjunct from a larger range
 END = Highly restricted range, endemic
 EXT? = Possibly extirpated in New York State
 HAB = Restricted to habitats rare in the State
 R = Rare throughout its range
 SNYS = Single New York station
 SPOR = Sporadic: scattered populations
 VULN = Vulnerable to commercial or private exploitation or imminent land development
 WRL, Western, eastern, northern or southern
 ERL, range limits, or nearing the periphery
 NRL, of their distributions
 SRL

Appendix II. Plant Rarities of New York State Recommended for Protection if in Combination With Other Rarities (Most of These Occur in the State Five Times or Fewer)

Status Code	Species	Habitats	Significance	Comments
ISOETACEAE				
T-3	<i>Isoetes eatonii</i> Dodge Eaton's Quillwort	Ponds, stream banks	R SPOR DECL	A few stations in NY, NJ, NH and MA, declining.
LYCOPODIACEAE				
E-3	<i>Lycopodium carolinianum</i> L. Carolina Clubmoss	Bogs and wet barrens	SNYS VULN NRL SPOR	Pantropical, sporadic, nearing its n. limits in e. North America.
T-3	<i>Lycopodium sabinaefolium</i> Willd. Ground-fir	Woods, clearings	SERL	A northern plant at s.e. range limits, NY, PA.
E-3	<i>Lycopodium sitchense</i> Rupr. Sitka Clubmoss	Summits, brushy slopes	SERL VULN EXT?	Northwestern species reaching its limits.
OPHIOGLOSSACEAE				
E-3	<i>Botrychium lunaria</i> (L.) Sw. Moonwort	Wooded slopes with limestone (in NY)	SRL DISJ SNYS SPOR VULN HAB	Circumboreal species, sporadic; one NY station verified 1981, others doubtful now, likely extirpated.
POLYPODIACEAE				
T-3	<i>Asplenium montanum</i> Willd. Mountain Spleenwort	Rocky slopes, acidic soils	HAB NRL VULN	Reaching its northeastern limits in N.E.
T-3	<i>Asplenium viride</i> Huds. Green Spleenwort	Calcareous slopes	DISJ SNYS SRL VULN	Circumboreal-arctic species, also known from Mt. Mansfield, VT.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Cystopteris protrusa</i> (Weath.) Blasd. Lowland Fragile Fern	Calcareous slopes, alluvia	NERL VULN R	Formerly listed as a variety of <i>C. fragilis</i> ; southern
T-3	<i>Dryopteris celsa</i> (Palm.) Small Log Fern	Swampy places, often on rotting logs	NERL	A more southern species known from NY near Rochester.
T-3	<i>Pallaea glabella</i> Mett. Smooth Cliff-brake	Cliffs, limestone	ERL	Widespread but often local species at eastern limits in NY, VT.
E-3	<i>Polystichum lonchitis</i> (L.) Roth Northern Holly Fern	Calcareous slopes	DISJ VULN SERL SNYS	Northwestern species disjunct at s.e. limits, NY.
T-3	<i>Woodsia alpina</i> (Bolton) S.F. Gray Alpine Woodsia	Rocky places, ledges	DISJ VULN SPOR SRL	Circumboreal-arctic species reaching southern limits.
T-3	<i>Woodsia glabella</i> R. Br. Smooth Woodsia	Cliffs and ledges, often calcareous	VULN SRL	Northern species reaching s. limits.
CUPRESSACEAE				
T-3	<i>Juniperus horizontalis</i> Moench Creeping Savin	Bogs and calcareous banks	SERL	A primarily northern species, ranging west as well.
POTAMOGETONACEAE				
T-3	<i>Potamogeton vaginatus</i> Turcz. Pondweed	Deep waters	HAB SRL R	Circumboreal, nearing southern limits.
ALISMACEAE				
E-3	<i>Echinodorus tenellus</i> (Mart.) Buch. var. <i>parvulus</i> (Engelm.) Fassett Slender Burhead	Shores, mud	SNYS? EXT? NRL	Southern species nearing northern limits; last seen 1928 in Queens.
POACEAE				
T-3	<i>Agrostis borealis</i> Hartm. Boreal Bentgrass	Alpine summits and slopes	SRL HAB VULN	Alpine to boreal-montane species; NY, N.E., NC, VA and western U.S.
T-3	<i>Bouteloua curtipendula</i> (Michx.) Torr. Side-oats Grama	Dry prairies, thickets	NERL DISJ	Common western and southern species at n.e. limits, NY, CT.
T-3	<i>Calamagrostis inexpansa</i> Gray Northern Reedgrass	Gravelly to peaty soil	SPOR	Mostly distributed north and west of NY State.
E-3	<i>Calamagrostis neglecta</i> (Ehrh.) Gaertn. Small, Northern Reedgrass	Shores	SERL SNYS EXT?	Circumboreal at southeastern limits, NY, NH.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Calamagrostis porteri</i> Gray Porter's Reedgrass	Dry, wooded slopes	R	Relatively rare species ranging from central NY to West Virginia.
E-3	<i>Erianthus giganteus</i> (Walt.) Muhl. Giant Beardgrass	Swamps and glades	DISJ NRL EXT? SNYS	A distinctly southern, widespread species reported by Fernald, 1943 (last collection 1833 in NY); also NJ.
E-3	<i>Festuca brachyphylla</i> Schultes Short-leaved Fescue	Summits	DISJ SNYS SERL	Arctic-alpine species, also western Cordilleran, reaching s.e. range limits.
T-3	<i>Hierochloë alpina</i> (Sw.) R.&S. Alpine Holy-grass	Peaty meadows and alpine slopes	SRL VULN	Arctic, circumboreal reaching southern limits; also in NH.
E-3	<i>Muhlenbergia capillaris</i> (Lam.) Trin. Slender Muhy	Sandy clearings	NRL SNYS?	A southern species reaching its northern limit, (last seen 1915).
T-3	<i>Oryzopsis canadensis</i> (Poir.) Torr. Canada Ricegrass	Acid, peaty slopes	DISJ SRL	A northern species with disjunct populations to WV.
E-3	<i>Panicum anceps</i> . Michx. Panic Grass	Swampy woods	SNYS DISJ VULN NERL	Southern and midwestern species reaching northern limits on L.I.
T-3	<i>Panicum calliphylum</i> Ashe Panic Grass	Woods	R	A rare species of scattered distribution, MA to MD. Sometimes called a var. of <i>P. bicknellii</i> .
T-3	<i>Panicum flexile</i> (Gatt.) Scribn. Panic Grass	Calcareous ledges, shores	HAB DECL	A calciphile with a broad range; rare in NY.
E-3	<i>Panicum leibergii</i> (Vasey) Scribn. Panic Grass	Open woods, grasslands	EXT? SNYS	Midwestern species, rare in northeast.
T-3	<i>Panicum lucidum</i> Ashe Panic Grass	Swampy woods	NRL	Southern species, spotty in northeast and midwest, reaching its limits, NY, CT.
T-3	<i>Panicum polyanthes</i> Schultes Panic Grass	Sandy, moist places	NERL	Nearing northeastern limits from south and midwest.
T-3	<i>Panicum scabriusculum</i> Ell. (including " <i>P. aculeatum</i> ") Panic Grass	Swampy, sandy woods	R NRL VULN	A rare, sporadically distributed species, reaching its northern limits.
T-3	<i>Panicum scoparium</i> Lam. Panic Grass	Shores and swales	NERL	Nearing northern limits from south and midwest.
T-3	<i>Panicum stipitatum</i> Nash Panic Grass	Swamps and wet meadows	NERL EXT?	Southern and midwestern species; northern limits in N.E. (last seen NY, 1928).
T-3	<i>Paspalum debile</i> Michx. Paspalum	Sandy, open places	NERL	Southern and western element reaching northeastern limits on L.I.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
E-3	<i>Poa cuspidata</i> Nutt. Bluegrass	Rocky woodland	NERL EXT?	Southern and midwestern element (last seen 1909) Staten Is. and Manhattan.
E-3	<i>Poa fernaldiana</i> Nannf. Fernald's Bluegrass	Alpine summits	SPOR SNYS SWRL	Northeastern alpine species at southern limits in N.E. and NY.
T-3	<i>Poa glauca</i> Vahl. Bluegrass	Dry, rocky, often calcareous slopes	SERL	Northwestern and Eurasian, reaching southeastern limits for U.S.
T-3	<i>Sporobolus clandestinus</i> (Biehl.) Hitchc. Rough Rushgrass	Sandy soils	NRL	Southeastern species reaching northern limits in CT, NY.
E-3	<i>Sporobolus heterolepis</i> Gray Northern Dropseed	Rich prairies and calcareous, rocky areas	DISJ VULN	A prairie species reaching its eastern limits.
T-3	<i>Uniola laxa</i> (L.) B.S.P. Slender Spikegrass	Wet woods and swamps	NERL	A southern species reaching n.e. limits.
CYPERACEAE				
T-3	<i>Carex aggregata</i> MacKenzie Sedge	Woods, meadows, thickets	NERL	An eastern to midwestern species at n.e. limits.
T-3	<i>Carex arcta</i> Boott Sedge	Moist woods, swales	SERL	A western and northern species at s.e. limits, NY, VT.
T-3	<i>Carex atherodes</i> Spreng. Sedge	Limey meadows, swales, etc.	SERL	A circumboreal species at southeastern limits, NY, OH.
T-3	<i>Carex atratiformis</i> Britt.	Alpine summits	SRL DISJ R	Arctic-alpine species at southern limits
T-3	<i>Carex barrattii</i> Schw. & Torr. Sedge	Pinelands, swamps	NRL	A coastal plain species reaching n. limits NY, CT.
T-3	<i>Carex caroliniana</i> Schwein. Sedge	Woods, meadows	SNYS NERL	Midwestern and southern species at n.e. limits, NY.
T-3	<i>Carex conjuncta</i> Boott Sedge	Moist habitats, limestone	NERL	Midwestern and Appalachian at n.e. limits NY.
T-3	<i>Carex cracae</i> Dew. ex Torr. Craw's Sedge	Meadows, bogs limestone	ERL	Western at eastern limits; local.
T-3	<i>Carex emoryi</i> Dew. Sedge	Wetlands, limestone	NERL	Southern and western species at n.e. limits, NY, NJ.
T-3	<i>Carex frankii</i> Kunth Sedge	Meadows, limestone	NERL	Southern and midwestern at n.e. limits.
T-3	<i>Carex gravida</i> Bailey Sedge	Rich woods, wet prairies	NERL	Midwestern and Appalachian reaching n.e. limit, NY.
T-3	<i>Carex livida</i> (Wahl.) Willd. Sedge	Calcareous wetlands	SRL	European, across N.A. reaching s. limits in NY, NJ.
T-3	<i>Carex lupuliformis</i> Sartw. Sedge	Swamps, calcareous	NERL	Midwestern to southern at n.e. limits VT, NY, CT.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
E-3	<i>Carex meadii</i> Dew. Sedge	Prairies	NERL SNYS	A southern and midwestern species at n.e. limits, NY.
T-3	<i>Carex nigra</i> (L.) Reich. Sedge	Cold, wet places	SWRL	Amphiatlantic at s.w. limits.
T-3	<i>Carex nigromarginata</i> Schwein. Sedge	Dry woods	NERL	Southern and midwestern at n.e. limits CT, NY.
E-3	<i>Carex richardsonii</i> R.Br. Sedge	Dry woods, prairies	SERL SYNS	Western species, reaching e. limits in OH, NY, VT.
T-3	<i>Carex sartwelli</i> Dew. Sedge	Calcareous bogs, swales	ERL	Western species reaching eastern limits, NY, PA, Quebec.
T-3	<i>Carex scirpoidea</i> Michx. Sedge	Subalpine, alpine	SRL VULN	Arctic, alpine circumboreal at s.e. limits N.E., NY.
T-3	<i>Carex straminea</i> Willd. Sedge	Marshes, swamps	NERL R SPOR	Reaching n.e. limits in MA, NY.
E-3	<i>Carex striatula</i> Michx. Sedge	Rich woods	SNYS? R SPOR	Coastal plain species rare and sporadic FL-MA, N.S.
T-3	<i>Carex styloflexa</i> Buckl. Sedge	Springs, low woods	NERL VULN	Coastal plain, mostly southern, north to NY, CT, VT.
T-3	<i>Carex tincta</i> Fern. Sedge	Fields, grassy slopes	SERL	Northern and western species at s.e. limits, NY.
T-3	<i>Carex vaginata</i> Tausch Sedge	Swamps, wet woods	SERL	Arctic-alpine, reaching s.e. limits in NY; circumboreal.
T-3	<i>Cyperus engelmannii</i> Steud. Engelmann's Cyperus	Swampy ground	NERL	Midwestern, eastern seaboard, at n.e. limits.
T-3	<i>Cyperus retrorsus</i> Chapm. Cyperus	Burns and clearings, dry sand	NRL	Coastal Plain and Piedmont species at n. limits.
T-3	<i>Eleocharis ambigens</i> Fern. Spikerush	Ponds and marshes	NRL	Coastal species nearing northern limits, NY, MA, WI.
T-3	<i>Eleocharis compressa</i> Sulliv. Flat-stemmed Spikerush	Calcareous wet places	NERL	Central U.S. species at n.e. limits.
T-3	<i>Eleocharis equisetoides</i> (Ell.) Torr. Knotted Spikerush	Shallow water	NRL SPOR	Southern species near northern limits.
T-3	<i>Eleocharis melanocarpa</i> Torr. Black-fruited Spikerush	Pinelands, shores	NERL DECL	A southeastern-midwestern species at n.e. limits NY, MA.
T-3	<i>Eleocharis ovata</i> (Roth) R. & S. Ovoid Spikerush	Moist open places	SERL	Scattered distribution north and west; s.e. range limits CT, NH, NY.
T-3	<i>Eleocharis quadrangulata</i> (Michx.) R. & S. Angled Spikerush	Pools, creeks, tidal shores	NERL	Central and southern species at n.e. limits.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Eleocharis tricostata</i> Torr. Three-ribbed Spikerush	Ponds, sandy areas	R NRL	Southeastern pine-barren species reaching northern limits.
T-3	<i>Eleocharis tuberculosa</i> (Michx.) R. & S. Large-tuberled Spikerush	Shores	HAB	Coastal plain species rare in NY (L.I.)
E-3	<i>Eriophorum angustifolium</i> Roth Cotton Grass	Calcareous meadows	SRL	Arctic species, reaching southern limits.
E-3	<i>Fimbristylis caroliniana</i> (Lam.) Fern. Sedge	Sandy soils, dunes	SNYS NRL EXT?	Southern species barely reaching L.I.
T-3	<i>Fimbristylis castanea</i> (Schult.) Torr. Sedge	Sand, brackish shores	NRL	Coastal plain species at n. limits (L.I.).
E-3	<i>Fimbristylis drummundii</i> Boeckl. Sedge	Barrens, meadow, prairies	NERL SNYS EXT?	Mostly southern and western.
T-3	<i>Psilocarya nitens</i> (Vahl) Wood Bald Rush	Wet sand, coastal bogs	NRL	Southeastern and usually coastal plain n. to NY, MA.
T-3	<i>Psilocarya scirpoidea</i> Torr. Bald Rush	Wet ground, pond margins	NERL	Southern and midwestern n. to NY, MA.
E-3	<i>Rhynchospora cephalantha</i> Gray Beakrush	Bogs and savannas	NRL SNYS	A coastal plain species reaching northern limits.
E-3	<i>Rhynchospora chalarocephala</i> Fern. Beakrush	Pond margins and swamps	NRL	Southeastern coastal plain species at northern limits.
E-3	<i>Rhynchospora globularis</i> Chapm. var. <i>recognita</i> Fern. & Gale Beakrush	Wet sand, clay or peat	SNYS NRL	Southern species reaching northern limits.
E-3	<i>Rhynchospora gracilenta</i> Gray Slender Beakrush	Wet sand and peat	SNYS NRL	Southeastern coastal plain element.
T-3	<i>Rhynchospora inundata</i> (Oakes) Fern. Horned Rush	Pond margins	NERL	Coastal plain element at n. limits NY, MA.
E-3	<i>Rhynchospora torreyana</i> Gray Torrey's Beakrush	Sand and peat	SNYS NRL	Southeast coastal plain species at n. limits.
T-3	<i>Scirpus clintonii</i> Gray Clinton's Clubrush	Dry to springy ledges and woods	SERL SPOR R	Spotty northern species
T-3	<i>Scirpus cylindricus</i> (Torr.) Britt. Saltmarsh Bulrush	Tidal shores, saltmarshes	SPOR R	A scattered n.e. coastal species on L.I. and in the tidal Hudson river. Often listed under <i>S. maritimus</i> .

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Scleria minor</i> (Britt.) Stone Nutrush	Peaty and boggy depressions	NRL	Southeastern species at northern limits.
T-3	<i>Scleria muhlenbergii</i> Steud. Nutrush	Bogs, swales, pinelands	NERL	Coastal plain to midwest, reaching n.e. limits.
T-3	<i>Scleria nitida</i> Willd. Nutrush	Dry sand	NRL	Southeastern, reaching northern limits.
T-3	<i>Scleria pauciflora</i> Muhl. var. <i>caroliniana</i> (Willd.) Wood Nutrush	Coastal pine scrub	NERL	A coastal variety of a southern-western species, reaching n. limits NH, MA, NY.
T-3	<i>Scleria verticillata</i> (Muhl.) Nees. Nutrush	Calcareous wet places	NRL	Southern; sporadic in northern range.
ERIOCAULACEAE				
T-3	<i>Eriocaulon parkeri</i> Robins. Hatpins, Pipewort	Tidal shores	VULN R	A coastal species rare in NY (only Hudson River).
COMMELINACEAE				
T-3	<i>Tradescantia virginiana</i> L. Spiderwort	Woods and roadsides	NRL	Eastern-central, reaching its northern limits.
JUNCACEAE				
T-3	<i>Juncus brachycarpus</i> Engelm. Rush	Damp soil	NERL	Coastal plain and midwestern species n.e. limits MA, NY.
E-3	<i>Juncus coriaceus</i> MacKenzie Rush	Wet ground, woods	SNYS NRL EXT?	Southern species at northern limits.
E-3	<i>Juncus debilis</i> Gray Rush	Pinelands, shores	SNYS EXT?	Southeastern species at northern limits.
T-3	<i>Juncus diffusissimus</i> Buckl. Rush	Wet ground	DISJ NRL	Southern; disjunct in NY.
T-3	<i>Juncus platyphyllus</i> (Wieg.) Fern. Rush	Acid soils	NRL	Coastal plain species, rare in NY.
T-3	<i>Juncus stygius</i> L. var. <i>americana</i> Buch. Rush	Bogs and pools, limestone	SRL	Boreal species reaching southern limits.
T-3	<i>Juncus trifidus</i> L. Rush	Barrens, tundra	VULN SRL DISJ HAB	Arctic and Eurasian, reaching southern limits (with a disjunct var. in NC).

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Juncus vaseyi</i> Engelm. Rush	Moist thickets, shores and meadows	SERL	Reports only, but as late as 1975 (Faust and Phelps); northern and western species.
E-3	<i>Luzula bulbosa</i> (Wood) Fern. Woodrush	Open woods, clearings	NRL	Southern species approaching northern range limits.
E-3	<i>Luzula spicata</i> (L.) DC. Spiked Woodrush	Tundra	SNYS SRL	Arctic species reaching southern limits.
LILIACEAE				
T-3	<i>Melanthium hybridum</i> Walt. Slender Bunchflower	Open woods	NERL	Appalachian and coastal plain at n. limits NY, CT.
T-3	<i>Melanthium virginicum</i> L. Bunchflower	Meadows, swales	NRL	A southern and midwestern species at northern limits.
T-3	<i>Smilax pulverulenta</i> Michx. Jacob's Ladder	Rich woods	NRL	A southern species reaching northern limits in RI.
T-3	<i>Tofieldia glutinosa</i> (Michx.) Pers. False Asphodel	Shores, marshes and wet ledges	SPOR	Ranging north and south of us but rare in NY.
T-3	<i>Trillium sessile</i> L. Toadshade	Rich woods	DISJ NERL	Southern and midwestern species, disjunct to western NY.
E-3	<i>Zigadenus elegans</i> Pursh ssp. <i>glaucus</i> (Nutt.) Hultén White Camass	Limestone and moist places	SPOR HAB	Great Lakes locally to N.E. (seen 1979 but extirpated at that location, 1980).
E-3	<i>Zigadenus leimanthoides</i> Gray False Camass	Pinelands, bogs and forest clearings	NRL	Coastal and Piedmont species at northern limits.
E-3	<i>Uvularia puberula</i> Michx. Bellwort	Woods	SNYS DISJ NRL EXT?	Southern species disjunct from WV to L.I. and NJ (<i>U. pudica</i> of manuals).
HAEMODORACEAE				
T-3	<i>Lachnanthes caroliniana</i> (Lam.) Dandy Redroot	Meadows, wet places, bogs	DECL	Once established in several lakes and bogs (L.I.), now often overgrown; southern.
ORCHIDACEAE				
E-3	<i>Calypso bulbosa</i> (L.) Oakes Calypso	Calcareous bogs, swamps and moist wooded slopes, conifer forests	SERL	Rare throughout the eastern portion of its range; very rare and disappearing in the northeastern U.S.
E-3	<i>Platanthera cristata</i> (Miehx.) Lindl. Crested Fringed Orchid	Moist, acidic dunes and pinebarrens (NY)	NERL DISJ VULN	Highly restricted at its n.e. range limit, threatened by land development.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
SALICACEAE				
T-3	<i>Populus heterophylla</i> L. Swamp Cottonwood	Floodplains and swamps	NRL	Coastal plain species nearing northern limits on L.I., MI.
T-3	<i>Salix glaucocephala</i> Fern. var. <i>albovestita</i> (Ball) Fern. Shoreline Willow	Great Lakes, dunes	SRL	Northern species-complex at southern limits.
E-3	<i>Salix herbacea</i> L. Dwarf Willow	Peaks	DISJ SNYS SRL VULN	Circumboreal, arctic species reaching southern limits on peaks.
E-3	<i>Salix pellita</i> Anderss. Satiny Willow	Cool banks and wetlands	SNYS SRL VULN	Northern species with southern range limits in NY and N.E.
T-3	<i>Salix syrticola</i> Fern. Sand-dune Willow	Dunes and shores	ERL DISJ	Great Lakes species (or variety of <i>S. cordata</i>); rare eastward.
T-3	<i>Salix uva-ursi</i> Pursh Alpine Willow	Peaks	VULN SRL	Arctic-alpine species reaching southern limits in NY and N.E., vulnerable, but not uncommon on high peaks.
BETULACEAE				
T-3	<i>Betula glandulosa</i> Michx. Dwarf Birch	Peaks	SRL VULN DISJ	Alpine species reaching southern limits.
T-3	<i>Betula minor</i> (Tuckerm.) Fern. Dwarf White Birch	Peaks	SRL DISJ	Alpine species reaching southern limits.
T-3	<i>Betula pumila</i> L. Swamp Birch	Bogs, calcareous fens, etc.	HAB	Northern species, scattered in calcareous places.
SANTALACEAE				
T-3	<i>Geocaulon lividum</i> Fern. Northern Comandra	Alpine and other montane sites	SRL DISJ	Arctic-alpine species reaching southern limits; easily overlooked.
ARISTOLOCHIACEAE				
T-3	<i>Aristolochia serpentaria</i> L. Snakeroot	Wooded, wet places	NERL	Southern and midwestern-ozarkian species reaching n.e. limits NY, CT.
POLYGONACEAE				
T-3	<i>Polygonum glaucum</i> Nutt. Seabeach Knotweed	Beaches	DECL VULN SPOR	Not found in several former sites; vulnerable to beach and dune disturbance.
T-3	<i>Rumex hastatulus</i> Muhl. Sorrel	Open fields, sandy sites	NRL	Southern plant reaching northern range limits.
T-3	<i>Rumex maritimus</i> L. var. <i>persicarioides</i> (L.) R. Mitchell Golden Dock	Beaches, marshes and shores	SRL VULN DECL	Plant of northern coastal marshes on the east and west coasts, reaching southern limit on L.I.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
AMARANTHACEAE				
T-3	<i>Amaranthus pumilus</i> Raf. Seabeach Amaranth	Beaches, shores	NRL SPOR R	Sporadically distributed from Nantucket, MA to NC.
AIZOACEAE				
T-3	<i>Sesuvium maritimum</i> (Walt.) B.S.P. Sea Purslane	Sandy shores	SPOR NRL R	A southern, coastal species, rarely found north of the Carolinas.
MAGNOLIACEAE				
T-3	<i>Magnolia virginiana</i> L. Sweet Bay	Swampforest	NRL	A coastal plain species reaching northern limits NY, MA.
CARYOPHYLLACEAE				
E-3	<i>Spergularia canadensis</i> (Pers.) G. Don Sand-spurrey	Saltmarshes and shores	SERL EXT?	A northern species not seen since 1887, but not conspicuous.
T-3	<i>Stellaria longipes</i> Goldie Starwort	Open woods	SERL	Ranges from Alaska to Greenland and southwestern states.
NELUMBONACEAE				
E-3	<i>Nelumbo lutea</i> (Willd.) Pers. Yellow Lotus	Ponds, lakes	NRL VULN	A southern and midwestern species reaching northern limits; perhaps introduced in NY by Indians.
RANUNCULACEAE				
E-3	<i>Clematis ochroleuca</i> Ait. Curly-heads	Woods, thickets, clearings	EXT? NRL VULN	Southern plant reaching northern limits on Staten Island.
E-3	<i>Ranunculus cymbalaria</i> Pursh Seaside Crowfoot	Brackish places	DECL VULN	Last seen 1927, but most of our records are 70-150 years old; habitats gone in central NY.
T-3	<i>Ranunculus micranthus</i> Nutt. Small-flowered Crowfoot	Woods, limestone	NRL	A southern species nearing northern limits.
E-3	<i>Ranunculus pusillus</i> Poir. Spearwort	Wet places	NRL	A southern and midwestern species at northern limits.
E-3	<i>Thalictrum dasycarpum</i> Fisch. & Llal. Purple Meadow-rue	Meadows	SNYS ERL	A primarily midwestern species.
T-3	<i>Thalictrum venulosum</i> Trel. Veiny Meadow-rue	Calcareous shores (NY)	SRL	A northern and western species reaching southern limits in NY, VT. (<i>T. confine</i> Fern.)
FUMARIACEAE				
T-3	<i>Corydalis aurea</i> Willd. Golden Corydalis	Open woods, limestone	SPOR	Only three twentieth century locations verified, distributed mostly northwest of NY.
T-3	<i>Corydalis flavula</i> (Raf.) DC. Yellow Harlequin	Woods and clearings	NERL	A southern and Great Lakes species at n.e. limits, CT, NY.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
BRASSICACEAE				
T-3	<i>Arabis missouriensis</i> Greene Rock-cress	Bluffs, rocky woods	SPOR	A scattered distribution over northeast and midwest, south to GA.
E-3	<i>Arabis shortii</i> (Fern.) Gleason Rock-cress	Riverbanks, bluffs and ledges	NERL SNYS EXT? VULN	Appalachian and western, extending to KS and VA.
T-3	<i>Cardamine rotundifolia</i> Michx. Mountain Watercress	Streamsides	NRL	Southern and midwestern species at northern limits.
E-3	<i>Draba glabella</i> Pursh Draba	Calcareous shores	SRL VULN HAB	Arctic-circumboreal reaching southern limits. Only locations in the U.S.
DROSERACEAE				
T-3	<i>Drosera filiformis</i> Raf. Dew-thread	Seeps and bogs	DECL VULN R END? or DISJ	A very local coastal species (MA to NJ) only on the tip of L.I. in NY; distinct from <i>D. tracyi</i> of SC to LA?
PODOSTEMACEAE				
T-3	<i>Podostemum ceratophyllum</i> Michx. Threadfoot	Flowing water	SPOR	Swift streams where it is locally abundant.
CRASSULACEAE				
T-3	<i>Sedum integrifolium</i> Raf. ssp. <i>leedyi</i> (Rosend & Moore) Clausen Roseroott	Cliffs and slopes	DISJ SPOR	Formerly treated under <i>S. rosea</i> ; very rare in NY.
T-3	<i>Sedum rosea</i> (L.) Scop. Roseroott	Cliffs and fellfields	DISJ SPOR	Arctic-alpine circumboreal species, extending south to VA.
T-3	<i>Sedum telephiooides</i> Michx. Live-forever, Orpine	Hills and cliffs	NRL	Appalachians to Illinois reaching northern limits.
T-3	<i>Tillaea aquatica</i> L. Water Pigmy-weed	Fresh water or tidal marshes	HAB SPOR	Widespread, worldwide, but sporadic in its distribution; often overlooked.
SAXIFRAGACEAE				
T-3	<i>Saxifraga aizoides</i> L. Yellow Mountain Saxifrage	Cliffs and calcareous seeps	SRL HAB	Arctic-circumboreal reaching southern limits, NY, VT.
T-3	<i>Saxifraga paniculata</i> Mill. ssp. <i>neogaea</i> (Butt.) D. Löve Saxifrage	Cliffs, rocky hillsides	SRL HAB	European and American boreal element reaching southern limits in VT and NY (<i>Saxifraga aizoön</i>).

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
ROSACEAE				
T-3	<i>Geum vernum</i> (Raf.) T. & G. Spring Avens	Woodlands, clearings	NERL	Mostly Appalachian to midwestern reaching northeastern limits.
T-3	<i>Potentilla paradoxa</i> Nutt. Bushy Cinquefoil	Moist places, shores	ERL	A western species reaching eastern limits; also Asian.
E-3	<i>Rubus chamaemorus</i> L. Cloudberry, Knotberry	Alpine zone and beaches	DISJ SNYS SRL EXT?	An arctic disjunct to ME, NH peaks and Montauk (L.I.), NY.
FABACEAE				
E-3	<i>Baptisia leucantha</i> T. & G. Prairie False Indigo	Clearings, prairies, woodland borders	DISJ SNYS NERL	A southern and midwestern species at northeastern limits; disjunct.
T-3	<i>Desmodium glabellum</i> (Michx.) DC. Tall Tick-clover	Sandy woods.	SNYS NERL	Plant of the midwest and southeast, reaching northeast limits NY, MA.
T-3	<i>Desmodium laevigatum</i> (Nutt.) DC. Smooth Tick-eloever	Sandy woods	NRL	Southern and midwestern species at northern limits.
T-3	<i>Desmodium nuttallii</i> (Schindl.) Shub. Nuttall's Tick-clover	Dry woods	EXT? NERL	Last collected 1879, commonest around NY City; at northern limits; southern/midwestern (<i>D. viridiflorum</i>).
E-3	<i>Desmodium pauciflorum</i> (Nutt.) DC. Small-flowered Tick-clover	Rich woods	SNYS NRL	Southern and midwestern species at northern limits.
E-3	<i>Galactia volubilis</i> (L.) Britt. Twining Milk-pea	Thickets, borders	NERL EXT?	A southern and midwestern species reaching northern limits (last seen 1872).
E-3	<i>Strophostyles umbellata</i> (Muhl.) Britt. Wild Bean	Sandy places	NRL SNYS	A southern and midwestern species reaching northern limits on L.I.
LINACEAE				
T-3	<i>Linum intercursum</i> Bickn. Wild Flax	Pine woods, sandy soil, downs	SPOR NRL HAB	Sporadic southern and midwestern species at northern limits NY, MA.
GERANIACEAE				
T-3	<i>Geranium sphaerospermum</i> Fern. Geranium	Clearings, limestone	SERL	A western and northern species reaching southeastern limits.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
EMPETRACEAE				
E-3	<i>Corema conradii</i> Torr. Brown Crowberry, Broom Crowberry	Mountain ledges in NY (usually coastal sands)	SNYS SPOR DISJ HAB VULN	Somewhat vulnerable in its only NY location, in path on State land, with development proceeding nearby. Northern species (usually coastal) south to NJ.
POLYGALACEAE				
T-3	<i>Polygala lutea</i> L. Yellow or Orange Milkwort	Moist, sandy places	NRL HAB	A coastal, southern species at northern limits.
E-3	<i>Polygala mariana</i> Mill. Pink Milkwort	Open sandy or peaty places	NRL SNYS	Southeastern coastal plain species reaching northern limits on L.I.
CALLITRICHACEAE				
E-3	<i>Callitrichia anceps</i> Fern. Water Starwort	Pools, shores	SNYS SRL	Arctic-alpine species at southern limits NY, NH, VT.
CELASTRACEAE				
T-3	<i>Euonymus americanus</i> L. Strawberry-bush	Rich woods	NRL	Southern species at northern limits.
HIPPOCASTANACEAE				
T-3	<i>Aesculus glabra</i> Willd. Ohio Buckeye	Low woods	NERL	Appalachian-ozarkian, reaching northeast limits.
RHAMNACEAE				
T-3	<i>Ceanothus ovatus</i> Desf. Redroot	Rocky places, prairies, pinelands	HAB DISJ	Maine to Texas, local in the northeast
HYPERICACEAE				
T-3	<i>Hypericum adpressum</i> Raf. Creeping St. John's-wort	Around ponds	NRL	Southern and midwestern; northern limits MA, NY.
E-3	<i>Hypericum densiflorum</i> Pursh St. John's-wort	Swamps	SNYS NERL	Southern and midwestern; northern limits, L.I.
E-3	<i>Hypericum gymnanthum</i> Engelm. & Gray St. John's-wort	Swamps, marshes, swales	NRL SPOR EXT?	Last seen 1902. A southern and midwestern element at northern limits on L.I.
T-3	<i>Hypericum hypericoides</i> (L.) Crantz St. Andrew's-Cross	Sandy places	NRL	Southern element reaching northern limits, L.I., MA.
CISTACEAE				
T-3	<i>Lechea racemulosa</i> Michx. Pinweed	Sandy woods, barrens	NERL	Midwestern and seaboard, reaching northeast limits on L.I.
T-3	<i>Lechea tenuifolia</i> Michx. Pinweed	Sandy, rocky woods, clearings	HAB	Maine to Texas and midwest (L.I. only in NY)

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
VIOLACEAE				
T-3	<i>Viola brittoniana</i> Pollard var. <i>pectinata</i> (Bickn.) Alex. Pectinate Violet	Meadows, thickets	HAB NRL	Uncommon coastal species at northern limits, L.I., MA.
T-3	<i>Viola hirsutula</i> Brainard Southern Wood Violet	Woods, clearings	NERL	Southern and midwestern at n.e. limits NY, CT.
T-3	<i>Viola stoneana</i> House Stone's Violet	Woods, thickets	NRL	Southern species reaching northern limits in NY.
LYTHRACEAE				
T-3	<i>Lythrum lineare</i> L. Saltmarsh Loosestrife	Saline or brackish marshes	SNYS NRL	Southern coastal plain species at northern limits.
MELASTOMACEAE				
T-3	<i>Rhexia mariana</i> L. Meadow Beauty	Damp, open places	NRL	Mostly coastal, southern species; northern limits, NY, MA.
ONAGRACEAE				
T-3	<i>Epilobium ciliatum</i> Raf. Willow-herb	Cliffs, ledges, calcareous bogs	SRL	Boreal to alpine species widespread but scattered southward.
T-3	<i>Epilobium hornemannii</i> Reichenb. Willow-herb	Streams, rocky banks	SRL SNYS?	Circumboreal-arctic element reaching southern, alpine limits in the east, NY, NH.
HALORAGACEAE				
T-3	<i>Myriophyllum alterniflorum</i> DC. Water Milfoil	Lakes, streams	SERL	A circumboreal species at southeast limits in NY, CT.
T-3	<i>Myriophyllum pinnatum</i> (Walt.) B.S.P. Green Parrot's-feather	Ponds, swamps	NRL	Reaching northern limits in NY, N.E.
T-3	<i>Proserpinaca pectinata</i> Lam. Mermaid-weed	Ponds, swamps	HAB	A coastal element, mostly on L.I. in NY.
ARALIACEAE				
C-3	<i>Panax quinquefolius</i> L. American Ginseng	Rich woods	VULN DECL	Under severe collecting stress, in need of increased management.
APIACEAE				
E-3	<i>Angelica lucida</i> L. Angelica	Coastal and sub-alpine meadows	SRL HAB	A circumboreal species reaching southern limits on L.I. (<i>Coelopleurum</i>).
T-3	<i>Berula erecta</i> (Huds.) Cov. Wild Parsnip	Wet places	ERL VULN	Western species reaching eastern limits on L.I.
T-3	<i>Chaerophyllum procumbens</i> (L.) Crantz Spreading Chervil	Rich woods	NERL	Ozarkian-Appalachian reaching n.e. limits in NY.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Eriogonum bulbosa</i> (Michx.) Nutt. Pepper and Salt, Harbinger of Spring	Rich woods	NRL	Reaching northern limits in NY, ONT.
E-3	<i>Hydrocotyle verticillata</i> Thunb. Pennywort	Lakes, river margins	NERL VULN	Western and southern, reaching limits in NY, N.E.
E-3	<i>Ligusticum scoticum</i> L. Scotch Lovage	Saltmarshes	EXT? SWRL VULN	Europe, Greenland to NY reaching southwestern limits on L.I.
T-3	<i>Oxypolis rigidior</i> (L.) Raf. Cowbane	Swampforests, marshes, bogs	NERL	Southern, midwestern reaching n.e. limits in NY.
PYROLACEAE				
E-3	<i>Pyrola minor</i> L. Mountain Pyrola, Shinleaf	Alpine woods, clearings	VULN SRL	Circumboreal-arctic species, reaching southern limits in our area.
MONOTROPACEAE				
E-3	<i>Pterospora andromedea</i> Nutt. Pine-drops		DECL EXT? SPOR	Although there are numerous old records, this plant has been collected only twice since 1919. Once widespread but sporadic, now drastically declining.
ERICACEAE				
E-3	<i>Cassiope hypnoides</i> (L.) D. Don Moss Heather	Peaks and fell-fields	EXT? SNYS SRL	Last seen (NY) 1879; southern range limits NH. Arctic-circumboreal (<i>Harrimanella</i>).
E-3	<i>Loiseleuria procumbens</i> (L.) Desv. Alpine Azalea	Arctic-alpine, open sites	SRL	Circumboreal-arctic element reaching southern limits NY, NH.
T-3	<i>Rhododendron calendulaceum</i> (Michx.) Torr. Flame Azalea	Woodlands	NRL	Extreme northern sites for a primarily Appalachian species.
T-3	<i>Rhododendron lapponicum</i> (L.) Wahl. Lapland Rose-bay	Peaks, cliffs	SRL VULN	Circumboreal-arctic species ranging south to NH, NY peaks.
T-3	<i>Vaccinium caespitosum</i> Michx. Dwarf Blueberry	Summits (NY), gravelly places	SERL VULN	A western and northern species reaching southeastern limits.
DIAPENSIACEAE				
T-3	<i>Diapensia lapponica</i> L. Diapensia	Summits, fellfields	SERL VULN	Circumboreal-arctic element reaching southern limits on peaks of NH, NY.
PRIMULACEAE				
E-3	<i>Lysimachia quadriflora</i> Sims. Four-flowered Loosestrife	Swamps, bogs, limestone areas	ERL VULN	Inland species reaching eastern limits (old records).
T-3	<i>Primula mistassinica</i> Michx. Bird's-eye Primula	Limestone cliffs, seepage banks (meadows)	SRL SPOR HAB	Arctic to boreal species reaching southern limits.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
GENTIANACEAE				
E-3	<i>Gentiana procera</i> Holm Fringed Gentian	Boggy, calcareous meadows, swales	HAB EXT? ERL VULN	Northwestern entity reaching eastern limits in NY.
T-3	<i>Gentiana puberula</i> Michx. Prairie Gentian	Dry prairies, fields	ERL EXT?	A midwestern species ranging south to GA and east to NY.
T-3	<i>Gentiana saponaria</i> L. Soapwort Gentian	Swamps, shores	NRL EXT?	A southern and midwestern species at northern limits.
T-3	<i>Halenia deflexa</i> (Sm.) Griseb. Spurred or Horned Gentian	Moist woods, bogs	SERL	Boreal plant reaching s.e. limits MA, NY (also Mexico).
T-3	<i>Sabatia campanulata</i> (L.) Torr. Slender Marsh-pink	Marshes, wet sand	NRL	Coastal plain species north to L.I. and MA coasts.
ASCLEPIADACEAE				
E-3	<i>Asclepias rubra</i> L. Milkweed	Marshes, pinelands	NRL SNYS	A coastal plain species at northern limits.
T-3	<i>Asclepias viridiflora</i> Raf. Green Milkweed	Clearings, dry open grasslands	NERL	A southern and western species at northern limits. Sporadic in the northeast.
POLEMONIACEAE				
E-3	<i>Phlox pilosa</i> L. Downy Phlox	Sandy woods, prairies	NERL	A southern and western species at northern limits. Sporadic in the northeast.
HYDROPHYLLACEAE				
E-3	<i>Ellisia nyctelea</i> L. Ellisia	Moist woods, disturbed soil	EXT? SNYS NERL	Last seen (NY) 1899; western and southern (sometimes adventive)
E-3	<i>Phacelia dubia</i> (L.) Trel. Phacelia	Woods, thiekets	SNYS NRL EXT?	A southern species, last seen (NY) in 1904.
BORAGINACEAE				
T-3	<i>Hackelia americana</i> (Gray) Fern. Stickseed	Woods, clearings, limestone cliffs	SERL	Northern and western species at southeastern limits in NY, VT (circumboreal if considered a variety of <i>H. deflexa</i>).
E-3	<i>Lithospermum canescens</i> (Michx.) Lehm. Puccoon	Sandy woods, clearings	EXT? NERL	Last seen in 1890 in NY, southern and midwestern at n.e. limits in NY.
E-3	<i>Lithospermum croceum</i> Fern. Puccoon	Woods, clearings	EXT? ERL	Last seen 1883 in NY. Great Lakes and plains states east to NY.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
LAMIACEAE				
T-3	<i>Blephilia ciliata</i> (L.) Raf. Wood Mint	Woods and clearings	NERL	A widespread species of eastern N.A. reaching northeast limits in VT, NY.
E-3	<i>Pycnanthemum clinopodioides</i> T. & G. Mountain-Mint	Woods, shores, thickets	R SPOR EXT?	Last seen (NY) 1893; a sporadically distributed species from MA to DE.
T-3	<i>Pycnanthemum torrei</i> Benth. Torrey's Mountain-Mint	Dry woods	NERL	Appalachian-ozarkian at northeastern limits in NY, CT.
T-3	<i>Pycnanthemum verticillatum</i> (Michx.) Pers. Mountain-Mint	Clearings, swales, thickets	SNYS SPOR	Northeastern species with a scattered distribution.
E-3	<i>Satureja glabella</i> (Michx.) Brid. var. <i>angustifolia</i> (Torr.) Sven. Wild Savory	Damp cliffs, sandy places	SNYS? DISJ ERL	At its eastern limits. A Great Lakes and midwestern variety (<i>S. arkansana</i>).
E-3	<i>Scutellaria elliptica</i> Muhl. Hairy Skullcap	Woods, clearings	NRL EXT?	Last seen (NY) 1879; extirpated? Southern, midwestern reaching northern limits.
T-3	<i>Scutellaria integrifolia</i> L. Skullcap	Clearings, thickets	NERL	Reaching northern limits in N.E., NY; southern-midwestern.
E-3	<i>Scutellaria nervosa</i> Pursh Skullcap	Rich woods	SNYS? EXT? NERL	Last seen (NY) 1867; extirpated? Appalachian and midwestern at n.e. range limits.
E-3	<i>Trichostema setaceum</i> Houtt. Blue-curls	Sandy places	HAB NRL	A coastal plain species at northern limits in CT, NY.
SOLANACEAE				
E-3	<i>Physalis grandiflora</i> Hook. Large, White-flowered Ground-cherry	Shores, clearings	EXT? SERL SNYS	Not seen (NY) since 1901; a boreal species reaching southeastern limits, NY, VT (<i>Chamaesaracha</i>).
T-3	<i>Physalis virginiana</i> Mill. Virginia Ground-cherry	Open woods, clearings	NERL	A species of the eastern U.S. reaching northeast limits, NY, CT.
SCROPHULARIACEAE				
T-3	<i>Agalinis racemulosa</i> Penn. Gerardia	Pine barrens, bogs	NRL	Coastal plain species at northern limits
E-3	<i>Buchnera americana</i> L. Blue-hearts	Grasslands, open woods	DECL NERL	Not seen (NY) since 1910, Appalachian-ozarkian reaching northeast limits in NY, ONT.
LENTIBULARIACEAE				
T-3	<i>Pinguicula vulgaris</i> L. Butterwort	Limestone seeps	SRL	Circumboreal; northern element reaching southern limits in NY, VT.
T-3	<i>Utricularia biflora</i> Lam. Two-flowered Bladderwort	Lakes, pools	NERL	Widespread species to the south and west, n.e. limits L.I. (<i>U. pumila</i>).

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Utricularia fibrosa</i> Walt. Fibrous Bladderwort	Ponds	HAB	A southern species reaching northern limits of MA.
T-3	<i>Utricularia radiata</i> Small Floating Bladderwort	Ponds	HAB	A southern species (to South America) reaching northern limits in N.S.
T-3	<i>Utricularia juncea</i> Vahl Rush Bladderwort	Wet, sandy or peaty places	NRL HAB	A southern coastal plain species; limit L.I.
PLANTAGINACEAE				
T-3	<i>Littorella uniflora</i> '(L.) Asch. Littorella, Shoregrass	Shores	SRL SPOR	Reaching southern limits; a northern and European species.
T-3	<i>Plantago pusilla</i> Nutt. Dwarf Plantain, Slender Plantain	Sandy clearings	HAB	Midwestern and southern with northeastern limits in N.E.
RUBIACEAE				
E-3	<i>Galium concinnum</i> T. & G. Shining Bedstraw	Woodlands	SNYS NRL EXT?	Appalachian and midwestern reaching northern limits, NY.
T-3	<i>Galium kamtschaticum</i> Steller Northern Wild-licorice	Cool woods	SRL	A northern species at southern limits, NY, N.E.
T-3	<i>Hedysotis purpurea</i> (L.) Hook. Southern Bluets	Dry slopes	DISJ NERL	A southern plant at northern limits.
T-3	<i>Hedysotis uniflora</i> (L.) Lam. Clustered Bluets	Moist, open sites	NRL	A southern species at northern limits, L.I.
CAPRIFOLIACEAE				
E-3	<i>Triosteum angustifolium</i> L. Feverwort, Horse-gentian	Woods, borders	SNYS NRL VULN	Reaching northern limits, L.I., CT; southern, midwestern.
T-3	<i>Viburnum edule</i> (Michx.) Raf. Squashberry	Rocky slopes, woods, thickets	SRL	Reaching southern limits in PA, NY. A northern species.
ADOXACEAE				
T-3	<i>Adoxa moschatellina</i> L. Moschatel	Moist woods, clearings	DISJ SPOR SERL	A sporadically distributed northern, western and Eurasian species, disjunct at extreme eastern limits in N.A.
VALERIANACEAE				
T-3	<i>Valerianella chenopodifolia</i> (Pursh) DC. Goosefoot Corn-salad	Meadows, fields	NERL	More western species reaching northeastern limits.
T-3	<i>Valerianella radiata</i> (L.) Dufr. Beaked Corn-salad	Open woods, fields, roadsides	NERL	Including <i>V. intermedia</i> ; one NY collection (1939) this century. A southern and midwestern species.

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
E-3	<i>Valerianella umbilicata</i> (Sulliv.) Wood Corn-salad	Low, rocky woods	R NERL EXT?	Last seen (NY) 1855; southern and midwestern
ASTERACEAE				
T-3	<i>Antennaria virginica</i> Stebb. Virginia Everlasting	Woods, clearings	R NRL	Last seen (NY) 1855, southern and midwestern.
E-3	<i>Arnica lanceolata</i> Nutt. Arnica	Alpine streambanks	VULN SERL	An alpine and western element reaching southeast limits NY, NH.
T-3	<i>Aster ciliolatus</i> Lindl. Aster	Streambank meadows	SERL	A western and northern species with s.e. limits in NY, N.E.
E-3	<i>Aster foliaceus</i> L. Aster	Meadows, shores	SNYS SRL	Boreal element at southern limits VT, NY, NH.
T-3	<i>Aster glomeratus</i> Bernh. Aster	Woods and thickets	SPOR EXT?	Not seen (NY) since 1915; ranging ME to VA.
T-3	<i>Aster radula</i> Ait. Aster	Swamps, marshes, bottomlands	SPOR HAB	Newfoundland to VA, scattered populations. L.I. only in NY.
T-3	<i>Bidens eatonii</i> Fern. Beggar-ticks	Estuary tidal flats and shores	SPOR SERL R	Known from Canada south to N.E. and NY; southeastern limits.
T-3	<i>Bidens hyperborea</i> Greene Estuary Beggar-ticks	Tidal flats and shores	SRL HAB	Reaching southern limits in NY, MA (formerly NJ).
T-3	<i>Cirsium altissimum</i> (L.) Spreng. Tall Thistle	Streambanks, meadows	NERL	A southern and midwestern species reaching n.e. limits in NY.
E-3	<i>Erigeron hyssopifolius</i> Michx. Daisy Fleabane	River bluffs	EXT? SRL SNYS	Not seen (NY) in 20th century. A northern species at southern limits.
T-3	<i>Eupatorium leucolepis</i> (DC.) T. & G. White Boneset	Open places	NRL	Western and southern widespread species reaching limits, NY, N.E.
T-3	<i>Gnaphalium purpureum</i> L. Purple Everlasting	Dry, open places	NERL	Western and southern widespread species reaching limits, NY, N.E.
E-3	<i>Liatis cylindracea</i> Michx. Blazing-star	Prairies	SNYS ERL EXT?	A central and midwestern species reaching eastern limits, NY, ONT.
T-3	<i>Polymnia uvedalia</i> L. Bearsfoot	Rich woods, clearings	NERL	Southern-midwestern reaching limits, NY.
T-3	<i>Prenanthes crepidinea</i> Michx. Rattlesnake-root	Clearings and thickets	NERL	Midwestern to Appalachians, at n.e. limits in w. NY.
T-3	<i>Prenanthes racemosa</i> Michx. Rattlesnake-root	Prairies, shores	ERL	A western species at eastern limits, NY, NJ. Not seen since 1917 (NY).

APPENDIX II. CONTINUED

Status Code	Species	Habitats	Significance	Comments
T-3	<i>Rudbeckia fulgida</i> Ait. Coneflower	Low, moist places	NERL	An Appalachian and midwestern species at northern limits. (<i>R. speciosa</i>).
T-3	<i>Silphium laciniatum</i> L. Compass Plant	Prairies, clearings	DISJ ERL SNYS	A prairie plant disjunct and at its eastern limit, NY.
T-3	<i>Solidago microcephala</i> (Greene) Bush Small-headed Goldenrod	Dry woods	NRL SNYS	A coastal plain species at northern limits, NY.
T-3	<i>Solidago rigida</i> L. Stiff-leaved Goldenrod	Fields, thickets	ERL	Coastal plain, prairie and southern species at eastern limits.

Appendix III. The New York State Protected Native Plant List

The list in Appendix III was enacted into State law in 1974 as a result of the efforts of a committee formed by the Department of Environmental Conservation. This committee was chaired primarily by Stanley J. Smith, at that time Curator of Botany at the New York State Museum. It sought the opinions of members of the State garden clubs, State agencies, universities and botanical institutions to determine which plants should be protected from gathering and commercial exploitation. The list should not be mistaken for a rare plant list, though some rarities are protected by it. Rather, it lists wild flowers and other plants (such as Dogwood, Azaleas and Trilliums) which are frequently gathered indiscriminately for flower arrangements, cultivation, or for momentary pleasure, and are then discarded. It was intended to discourage the gathering of plants on State and private land without permission. It underlines the fact that the plant life on a piece of land is the property and responsibility of the landowner, unlike wildlife which is managed by government agencies.

Protected Native Plants

Effective September 1, 1974, no one may knowingly pick, pluck, sever, remove or carry away, without the consent of the owner thereof, any protected plant. Violations of the law are punishable by fines of up to \$25 each (Environmental Conservation Law § 9-1503). The following are native plants which shall be protected pursuant to the above law and state regulation (NYCRR § 193.3). Such list shall apply statewide.

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
Creeper-dragon (Dragonroot)	<i>Arisaema dracontium</i>	American Bee-balm; Oswego Tea (Indian-heads; Scarlet Bee-balm)	<i>Monarda didyma</i>
Butterfly-weed (Chigger-flower; Orange Milkweed (Pluerisy-root))	<i>Asclepias tuberosa</i>	Bayberry (Candleberry)	<i>Myrica pensylvanica</i>
Bluebell-of-Scotland (Harebell)	<i>Campanula rotundifolia</i>	Lotus (Lotus Lily; Nelumbo; Pond-nuts; Water Chinquapin; Wonkapin; Yellow Lotus)	<i>Nelumbo lutea</i>
American Bittersweet (Waxwork)	<i>Celastrus scandens</i>	Prickly Pear (Wild Cactus; Indian Fig)	<i>Opuntia humifusa (O. compressa, p.p.)</i>
Pipsissewa (Prince's-pine; Waxflower) Spotted Evergreen (Spotted Wintergreen)	<i>Chimaphila spp.</i>	All Native Orchids, including: Adder's-mouth (Malaxis); Arethusa (Dragon's-mouth; Swamp-pink); Bog-candle (Scent-bottle); Calopogon (Grass-pink; Swamp-pink); Calypso (Fairy-slipper); Coral-root; Cypridium (Lady's-slipper); Moccasin-flower, nerve root); Cooley-era (Lattice-leaf; Rattlesnake-plantain); Kirtle-pink; Ladies'-tresses (Pearl-twist; Screw-auger); Orange-plume; Orchis; Pogonia (Beard-flower, Snake-mouth); Putty-root (Adam-and-Eve); Soldier's-plume; Three-birds, Twayblade; Whippoorwill-shoe	<i>Orchidaceae</i>
Flowering Dogwood	<i>Cornus florida</i>	Colden-club	<i>Orontium aquaticum</i>
Sundew (Daily-dew; Dewthread)	<i>Drosera spp.</i>	Cinseng (Sang)	<i>Panax quinquefolius</i>
Trailing Arbutus (Ground Laurel; Mayflower)	<i>Epigaea repens</i>	Wild Crabapple	<i>Pyrus coronaria</i>
Burning-bush (Wahoo) Strawberry-bush (Bursting-heart)	<i>Euonymus spp. (Native)</i>	Azalea; Great Laurel (White Laurel); Honey-suckle; Pinxter (Election-pink; Pinxter-bloom); Rhododendron (Rosebay); Rhodora	<i>Rhododendron spp. (Native)</i>
All ferns, including: Adder's-tongue, Azolla, Buckhorn, Cliff Brake, Curly-Crass, Fiddleheads, Hart's-tongue, Maidenhair, Moonwort, Polypody, Rock Brake, Salvinia, Spleenwort, Walking-leaf, Wall-rue, Water-spangle, Woodsia.	<i>Filices (Filicinae: Ophioglossales and Filicales) (Native)</i>	Bitterbloom (Marsh-pink; Rose-pink; Sabatia; Sea-pink)	<i>Sabatia spp.</i>
But excluding Bracken (<i>Pteridium aquilinum</i>); Hay-scented Fern (<i>Dennstaedtia punctilobula</i>); Sensitive Fern (<i>Onoclea sensibilis</i>), which are not protected.		Bloodroot (Puccoon-root, Red Puccoon)	<i>Sanguinaria</i>
Ague-weed, Blue-Bottles, Centian (Call-of-the-earth)	<i>Gentiana spp.</i>	Pitcher-plant (Huntsman's-cup; Sidesaddle-flower)	<i>Sarracenia purpurea</i>
Golden Seal (Orange-root, Yellow Puccoon)	<i>Hydrastis canadensis</i>	Wild Pink	<i>Silene caroliniana</i>
Holly (Hulver); Inkberry (Bitter Callberry); Winterberry (Black Alder)	<i>Ilex spp. (Native)</i>	Bethroot (Birthroot; Squawroot; Stinking Benjamin; Wake-robin); Toadshade, Trillium	<i>Trillium spp.</i>
Laurel, Spoonwood (Calico-bush) Wick (Lambkill)	<i>Kalmia spp.</i>	Globe-flower (<i>Trollius</i>)	<i>Trollius laxus</i>
Lily, Turk's cap	<i>Lilium spp. (Native)</i>	Bird's-foot Violet	<i>Viola pedata</i>
Cardinal-flower (Red Lobelia)	<i>Lobelia cardinalis</i>		
All Clubmosses, including: Bear's-bed (Christmas-green, Running Evergreen; (Trailing Evergreen; Ground Pine); Bunch Evergreen, Festoon Pine (Coral Evergreen; Buckhorn; Staghorn Evergreen; Wolf's-claws); Ground Cedar (Creeping Jenny); Ground Fir; Heath Cypress	<i>Lycopodium spp.</i>		
Bluebell (Roanoke-bells; Tree Lungwort, Virginia Bluebell; Virginia Lungwort, Virginia Cowslip)	<i>Mertensia virginica</i>		

Glossary

Adaptability—capability of surviving environmental change (see adaptation).

Adaptation—adjustment of organisms to environment; this may involve changes in individual form or function, or the term may be applied to genetic changes in populations and species over time.

Apomixis—(=Apogamy) reproduction without the fusion of sex cells, resulting in the production of new individuals.

Bipinnate—twice divided (compound) with leaflets arranged on each side of common stalks.

Bog—a wet place, usually covered with a peat moss (*Sphagnum*) mat, deriving its moisture primarily from the atmosphere. The term is often used loosely to include some types of fens, swales and marshes.

Calcareous—lime rich.

Calyx—the lower (outer) sterile series of flower parts (sepals).

Chromosomes—discrete nuclear bodies within cells which carry genetic materials and control cell function. A given species usually has a characteristic chromosome number.

Clove—a Catskill term for a steep-sided, often V-shaped valley which reminds one of the cloven hoof of an animal.

Clone—a series of genetically identical individuals, derived from the tissue of a single parent.

Damping-off—a disease which attacks young seedlings at ground level, often caused by the fungi *Pythium* and *Rhizoctonia*.

D.E.C.—an acronym for the New York State Department of Environmental Conservation, sometimes called EnCon.

Disjunct—(population) occurring outside the continuous range of the species, usually by considerable distance.

Downs—heavily grazed grassland (Montauk, Long Island once had such areas which were named for the downs of Great Britain).

Endangered—(plant species) near extirpation or extinction.

Endemic—restricted in distribution range.

Environment—components of an organism's surroundings which interact with it.

Estuarine—associated with an estuary—a body of water continuous with the ocean, often tidally influenced.

Fauna—animal life.

Fen—peat-forming wetland whose water supply contains nutrients from mineral soil water.

Flora—plant life; a flora is also a botanical treatment of an area.

Floret—a small flower; usually applied to one of a dense cluster, as in grasses.

Frond—a (fern) leaf; usually compound.

Habitat—immediate surroundings of an organism.

Heterozygous—genetically diverse (said of populations or species).

Homozygous—genetically homogeneous (said of populations or species).

Hummock—a small raised place, often caused by a growth of grass, sedge, rush or moss.

Ion—an electrically charged chemical group or particle.

Marl—a soil rich in calcium carbonate, clay and sand; sticky when wet, crumbly when dry.

Marsh—a place of saturated soil and standing water.

Mycorrhiza—association between a fungus and the roots of a plant; symbiotic or weakly parasitic.

Microclimate—a small climate within a larger one, the condition being caused by habitat irregularities.

Natural pavement—areas where the flat surfaces of bedrock strata are exposed.

Nature Conservatory, The (TNC)—a private, not-for-profit organization which purchases tracts of land for the purpose of their preservation in the natural state.

Niche—ecological space; often used to mean the place which an organism occupies (or may occupy within its tolerance limits).

Parasitic—drawing sustenance from another organism while living on or within it.

Palmate—with lobes or divisions radiating from a common point.

Pedicel—flower stalk.

Petaliferous—petal bearing.

pH—a measure of acidity/alkalinity; negative hydrogen ion concentration (14 pt. scale with 7.0 as neutral).

Physiography—configuration of the land (physical geography).

Pinnae—(pinna) leaflets of compound leaves of ferns.

Pinnate—(leaf) with leaflets arranged on either side of a common stalk; feather-like arrangement.

Plastic—(said of organisms) capable of modifying to compensate for environmental changes.

Pluvial—rainy, cool period.

Pteridophytes—ferns and related plants which reproduce by spores rather than seeds.

Rainshadow—a dry zone on the “down-weather” side of a ridge.

Rhizome—underground, usually prostrate stem.

Relict—(population) remnant of a formerly wider distribution.

Saprophytic—deriving nutrition from dead organic matter such as leaf litter.

Sepal—part or lobe of the calyx of a flower—one of the lowermost whorl of flower parts.

Serpentine—(soils) rich in magnesium silicate, weathering white to reddish or greenish.

Sori—(sorus) aggregations of sporangia on fern leaves.

Sporangia—(sporangium) small, spore-bearing organs; in ferns often helmet-like and opening explosively.

Spore—(as used here) reproductive cell of a non seed plant.

Stipe—stalk (of a fern frond).

Stream-capture—transfer of stream flow from one watershed to another by natural processes.

Substrate—(of a plant) the materials in which a plant is rooted.

Succession—progressive changes in the structure and species-composition of a biological community at a given site.

Swale—a marshy depression; often open with characteristic ground water flow.

Taxa—(taxon)—originally meaning taxonomic levels; now commonly used to mean species or organisms at those levels (such as members of species or varieties).

Taxonomy—the science of classification and processes leading to it.

Tetraploid—having four sets of chromosomes (or double the usual number).

Threatened—(plant species) likely to become endangered in the near future.

Tundra—turfy, open community of arctic and alpine climates.

Vegetative reproduction—propagation without the sexual process, such as cloning, suckering and apomixis.

Index to Species Treated in the Text

Aconitum noveboracense	41	Panax quinquefolius	69
Adoxa moschatellina	42	Panicum aculeatum	53
Agalinis acuta	43	Panicum scabriusculum	53
Amerorchis rotundifolia	31	Pellaea glabella	20
Anemone multifida	44	Phyllitis scolopendrium	20
Asplenium montanum	14	Plantago cordata	54
Asplenium viride	14	Platanthera cristata	39
Bidens bidentoides	7	Platanthera flava	9
Botrychium lunaria	14	Platanthera leucophaea	40
Botrychium minganense	17	Poa paludigena	55
Botrychium ternatum	17	Polystichum lonchitis	25
Calamagrostis porteri	45	Potamogeton hillii	56
Calypso bulbosa	32	Potamogeton lateralisis	8
Cardamine longii	46	Prenanthes boottii	57
Cheilanthes lanosa	17	Primula mistassiniae	9
Corallorrhiza striata	33	Pyxidanthera barbulata	58
Corema conradii	47	Rhynchospora pallida	59
Cypripedium arietinum	33	Sagittaria teres	60
Cypripedium candidum	33	Schizaea pusilla	25
Cystopteris protrusa	20	Schwalbea americana	8
Helianthemum dumosum	48	Scirpus ancistrochaetus	61
Helianthemum propinquum	49	Scirpus longii	62
Helonias bullata		Solidago houghtonii	63
Hottonia inflata	50	Trifolium reflexum	64
Hydrastis canadensis	67	Trollius laxus	65
Isotria medeoloides	37	Valeriana uliginosa	8
Listera auriculata	38	Viola novae-angliae	66
Lygodium palmatum	20	Woodsia alpina	25
Micranthemum micranthemosides	51	Woodsia glabella	25
Muhlenbergia torreyana	52	Woodsia oregana	25

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1981

Bulletin No. 445
New York State Museum

The University of the State of New York
The State Education Department
Albany, New York 12230